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**Department of Defense  
Fiscal Year (FY) 2022 Budget Estimates**

May 2021



**Army**

*Justification Book Volume 2a of 2*

***Research, Development, Test & Evaluation, Army***

**RDT&E – Volume II, Budget Activity 4**

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Army • Budget Estimates FY 2022 • RDT&E Program

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**RESEARCH, DEVELOPMENT, TEST AND EVALUATION, ARMY**  
**APPROPRIATION LANGUAGE**

For expenses necessary for basic and applied scientific research, development, test and evaluation, including maintenance, rehabilitation, lease, and operation of facilities and equipment, \$12,799,645,000.00 to remain available for obligation until September 30, 2023.

The FY 2022 Overseas Contingency Operations accounted for in the base budget are as follows:

Direct War cost accounted for in the Base Budget \$67,710,000: Direct War costs are those combat or direct combat support costs that will not continue to be expended once combat operations end at major contingency locations.

Enduring costs accounted for in the Base budget: \$41,546,000: Enduring Requirements are enduring in theater and in CONUS costs that will likely remain after combat operations cease, and have previously been funded in OCO.

FY 2021 includes Division C, Title IX and Division J, Title IV of the Consolidated Appropriations Act, 2021 (P.L. 116-260).

FY 2020 includes Division A, Title IX and X of the Consolidated Appropriations Act, 2020 (P.L. 116-93), Division F, title IV and V from the Further Consolidated Appropriations Act, 2020 (P.L. 116-94) and the Coronavirus Aid, Relief, and Economic Security Act (P.L. 116-136).

**COST STATEMENT**

The following Justification Books were prepared at a cost of \$472,560: Aircraft (ACFT), Missiles (MSLS), Weapons & Tracked Combat Vehicles (WTCV), Ammunition (AMMO), Other Procurement Army (OPA) 1 – Tactical & Support Vehicles, Other Procurement Army (OPA) 2 – Communications & Electronics, Other Procurement Army (OPA) 3 & 4 - Other Support Equipment & Spares, Research, Development, Test and Evaluation (RDTE) for: Budget Activity 1, Budget Activity 2, Budget Activity 3, Budget Activity 4, Budget Activity 5A, Budget Activity 5B, Budget Activity 5C, Budget Activity 6, Budget Activity 7, and Budget Activity 8.

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**FY 2022 RDT&E, ARMY PROGRAM ELEMENT DESCRIPTIVE SUMMARIES**  
**Introduction and Explanation of Contents**

1. **General.** The purpose of this document is to provide summary information concerning the Research, Development, Test and Evaluation, Army program. The descriptive summaries are comprised of R-2 (Army RDT&E Budget Item Justification – program element level), R-2A (Army RDT&E Budget Item Justification – project level), R-3 (Army RDT&E Cost Analysis), R-4 (Schedule Profile Detail) and R-5 (Termination Liability Funding for MDAPs) Exhibits, which provide narrative information on all RDT&E program elements and projects through FY 2021.

2. **Relationship of the FY 2022 Budget Submitted to Congress to the FY 2021 Budget Submitted to Congress.** This paragraph provides a list of program elements/projects that are major new starts, restructures, developmental transitions, and terminated programs. Explanations for these changes can be found in the narrative sections of the Program Element R-2A Exhibits.

**New Start Programs:**

<b><u>Budget Activity</u></b>	<b><u>OSDPE / Project</u></b>	<b><u>Project Title</u></b>
01	0601104A / CI9	Strategic University Basic Research Alliance
02	0602141A / CJ1	Lethality Enabling University Applied Research
02	0602147A / AF1	Long Range Maneuverable Fires (LRMF) Technology
02	0602181A / CM7	Collaborative Convergence Applied Research
02	0602182A / CN4	Network Enabling University Applied Research
02	0602183A / CL5	Air Platform Enabling University Applied Research
02	0602184A / CK9	Advancing Concepts and Technology Forecasting Tech
02	0602184A / CN2	Intelligent Weapons Concepts and Technologies
02	0602184A / CN9	Soldier Enabling University Applied Research
02	0602184A / CO1	Soldier Power And Energy Concepts and Technologies
02	0602184A / CO2	Soldier-Intelligent Technology Research
02	0602386A / CP6	Biotechnology Demonstration and Evaluation
03	0603025A / CK8	Advanced Technology Development and Convergence
03	0603041A / CL9	Collab Battlefield Networked Leth Sys Adv Tech
03	0603041A / CM2	Collaborative Convergence Adv Tech Development
03	0603041A / CM8	Convergence Battlefield Integration

03	0603042A / CN3	Network Enabling University Adv Development
03	0603043A / CL4	Air Platform Enabling University Adv Development
03	0603044A / CN8	Soldier Enabled University Advanced Development
03	0603119A / CJ9	Ground Enabling University Adv Development
03	0603386A / CP7	Foundational Biotechnology Design and Development
03	0603462A / BH4	Ground Vehicle Holistic Defense Adv Tech
03	0603463A / AO3	Network C3I Advanced Technology
03	0603463A / AO6	Network C3I Advanced Technology
03	0603463A / AP6	Network C3I Advanced Technology
03	0603463A / AP8	Network C3I Advanced Technology
04	0604019A / BU9	IFPC High Energy Laser
04	0604019A / CO6	IFPC High Power Microwave (HPM)
04	0604115A / CE4	Emerging Technology Initiatives Development
04	0604403A / FM3	Future Interceptor
04	0604531A / CQ5	C-SUAS JOINT NEW CAPABILITIES DEVELOPMENT
04	0604531A / CQ6	C-SUAS JOINT ENABLING CAPABILITIES DEVELOPMENT
05	0303667A / CR1	Citizen Broadband Radio System
05	0304270A / CK3	TLS Echelon Above Brigade (EAB)
05	0604601A / S70	Personnel Recovery Support System (PRSS)
05	0604802A / CE3	Precision Munition (Sniper)
05	0604804A / VR7	Combat Service Support Systems
05	0604818A / EJ6	TACTICAL ENHANCEMENT
05	0605053A / BS9	Robotic Payloads
05	0605143A / BX5	Biometrics Enabling Capability (BEC)
05	0605531A / CQ7	C-SUAS JOINT NEW CAPABILITIES
05	0605531A / CQ8	C-SUAS JOINT ENABLING CAPABILITIES
07	0307665A / BI7	Biometrics Enabled Intelligence
07	0607131A / CP2	Precision Fire Technology Improvements

**Program Element/Project Restructures:**

<b><u>Budget Activity</u></b>	<b><u>Old OSDPE / Project: Title</u></b>	<b><u>New OSDPE / Project</u></b>
01	0601102A / AA1 AA2 AA6 AA7 AA8 AB1 AB2 AB4 AC6: Multiple	0601601A / CL3
01	0602785A / 790: Manpower/Personnel/Training Technology	0603040A / CL1
02	0602787A / MM8: Infectious Diseases and Applied Rsch Technology	0603002A / CJ3
02	0602787A / MN1: Applied Sensory Systems Trauma Technology	0602787A / MK4, MM4
02	0602141A / AH9: Advanced Warheads Technology	0602141A / CJ6
02	0602141A / AI1: Advanced Terrain Shaping Technology	0602141A / CF8
02	0602143A / BC3: Soldier Decision Making & Comms Performance Tech	0602184A / CO2
02	0602143A / BD6: Soldier Sys Interfaces/Integration- Sensor Tech	0602180A / CL7
02	0602144A / CA9: Predictive Maintenance	0602180A / CN7
02	0602145A / BF6: Crew Augmentation and Optimization Tech	0602144A / CG8
02	0602145A / BF8: Artificial Intelligence & Machine Learning Tech	0602180A / CL7
02	0602145A / BF8: Artificial Intelligence & Machine Learning Tech	0602183A / CL5
02	0602145A / BF9: Sensors for Autonomous Operations and Surv Tech	0602180A / CL2
02	0602145A / BG6: Advanced Concepts for Active Defense Technology	0602144A / CG7
02	0602145A / BH5: Platform Electrification and Mobility Tech	0602144A / CG6
02	0602145A / BH9: Protection for Autonomous Systems Tech	0603041A / CM8
02	0602145A / BI2: Sensor Protection Technology	0602144A / CG5
02	0602146A / AN7: COE - Every Receiver is a Sensor Technology	0602180A / CL2
02	0602146A / AO5: Tag Track and Locate Small Satellites Technology	0602146A / CK1, CG3
02	0602146A / AP4: CEMA Camouflage Technology	0602182A / CM9, CN5
02	0602146A / AQ9: Expeditionary Data to Decisions Technology	0602146A / CI3
02	0602146A / AV6: Airborne Engineering Support Technology	0603463A / CI7
02	0602148A / AI5: Next Gen Tactical UAS TD Technology	0602148A / CH2
02	0602148A / AJ4: Digital Vehicle Management and Control Technology	0602148A / CG9
02	0602148A / AK2: Aviation Survivability Technology	0602183A / CN1
02	0602148A / AK2: Aviation Survivability Technology	0602148A / CH3
02	0602148A / AK4: Multi-Role Small Guided Missile Technology	0602148A / CI5



02	0602148A / AK9: Adv Teaming for Tactical Aviation Operations Tech	0602183A / CL8
02	0602148A / AM4: Opt Energy Stg & Therm Mgmt for FVL Survivability	0602148A / CH4
02	0602150A / AC9: High Energy Laser Tactical Vehicle Demonstrator Te	0603466A / AD1
02	0602150A / AD2: High Energy Laser (HEL) Enabling and Support Techn	0602141A / CF7
02	0602150A / AD3: Maneuver Air Defense Technology	0602141A / CJ7
02	0602213A / CY8: Cyber Security App Research and Exper Partner Tech	0603463A / CI7
02	0602213A / CY8: Cyber Security App Research and Exper Partner Tech	0602146A / CI3
02	0603002A / MO9: Vaccines to Prevent Dengue Fever Advanced Tech	0603002A / CJ3
02	0603007A / 792: Personnel Performance & Training	0603040A / CL6
03	0603116A / AI3: Terminal Weapons Effects Against Structures and Critical Targets Tech	0603116A / CH5
03	0603118A / BC4: Soldier Decision Making&Comms Performance AdvTech	0603465A / AL9
03	0603463A / AM9: Protected SATCOM Advanced Technology	0603463A / CI7
03	0603463A / AM9: Protected SATCOM Advanced Technology	0602146A / AN3
03	0603463A / AO3: Stand-In Advanced RF Effects (STARE) Adv Tech	0603463A / AO7
03	0603463A / AO6: Tag Track and Locate Small Satellites Adv Tech	0603463A / CJ8
03	0603463A / AP6: C4ISR Integrated Demonstrations Advanced Tech	0603463A / AN4, AM9, AP9
03	0603463A / AP8: Comms/Horiz Int for Army Mod Priorities Adv Tech	0603041A / CL9, CL2, CM8
03	0603463A / AQ1: Spectrum Obfuscation Advanced Technology	0603463A / CI7
03	0603463A / AQ5: Sensor CE-Integrated Sensor Architecture Adv Tech	0603463A / CI7
03	0603463A / AQ8: High Tempo Data Driven Decision Tools Adv Tech	0603463A / CI7
03	0603463A / AU6: Automated Analytics for Operational Environment AT	0603463A / CF9
03	0603463A / AV2: LEO Advanced Technology	0603463A / CJ8
03	0603463A / BZ8: Aerial Tier Networking (High Altitude)	0602146A / AN3
03	0603465A / AJ1: Future UAS Engine Advanced Technology	0603465A / AI8
03	0603465A / AJ5: Digital Vehicle Management & Control Advanced Tech	0603465A / CH6
03	0603465A / AK3: Aviation Survivability Advanced Technology	0603465A / CH8, CG1
03	0603465A / AM5: Opt Energy Stg & Therm Mgmt for FVL Surv Adv Tech	0603465A / CH7
03	0603466A / AD6: Next Generation Fires Radar Advanced Technology	0602141A / CG4
04	0603327A / FG9: Air and Missile Defense (AMD) Electronic Warfare	0604741A / 126
04	0603619A / 606: Cntrmn/Barrier Adv Dev	0603619A / CE5

04	0603639A / BQ4: 155mm Artillery Propulsion XM654	0604802A / BQ3
04	0603639A / FG1: Cannon-Delivered Area Effects Munitions (C-DAEM)	0604802A / FG1
04	0603766A / 907: Tactical Electronic Surveillance System - Adv Dev	0603766A / BX9, CC5, BY9
04	0603774A / VT7: Soldier Maneuver Sensors - Adv Dev	0603774A / BQ5
04	0603801A / F12: Future Attack Reconnaissance Aircraft	0603801A / CK7
04	0603807A / 811: Mil HIV Vac&Drug Dev	0604807A / 849
04	0604017A / FD2: Soldier Robotics Systems	0605053A / BS9
04	0604117A / FI4: Maneuver - Short Range Air Defense (M-SHORAD)	0604117A / CR9, CS1
04	0604120A / ED5: Assured Positioning, Navigation and Timing (PNT)	1206120A / FJ8
04	0604120A / EH8: DISMOUNTED	1206120A / FJ9
04	0604120A / EH9: PSEUDOLITES	1206120A / FK1
04	0604120A / EJ2: MOUNTED	1206120A / FK2
04	0604120A / EJ3: ANTI-JAM ANTENNA	1206120A / FK3
04	0604121A / FD6: Synthetic Training Environment Refine & Prototype	0604121A / CR2, CR3, CR4, CR5, CR7
04	0604121A / SV1: Soldier/Squad Virtual Trainer	0604121A / CR4, CR6
04	0604182A / HX1: Long-Range Hypersonic Weapon	0605232A / HX2
04	0604319A / DU3: IFPC2	0605052A / EY7
04	0604710A / L67: Soldier Night Vision Devices	0604710A / BQ6
04	0604807A / 812: Mil HIV Vac&Drug Dev	0604807A / 849
04	0604808A / 016: Close Combat Capabilities ENG DEV	0604808A / CS2, CS3
04	0604823A / L86: LIGHTWEIGHT COUNTER MORTAR RADAR (LCMR)	0607148A / BY8
04	0604823A / L88: Enhanced AN/TPQ 36	0607148A / BY8
05	0304270A / EW5: Electronic Warfare Development - MIP	0607313A / CE2
05	0304270A / EW6: ARAT-TSS - MIP	0304270A / CR8
05	0604798A / FG7: Emerging Technology Initiatives	0605054A / FI3
05	0605013A / 738: AcqBiz	0605013A / FL9
05	0605013A / FL9: Army Accessioning IT Development	0605233A / CP8
05	0605036A / EQ5: Combating Weapons of Mass Destruction (CWMD)	0605036A / CS6
05	0605041A / EV5: Defensive CYBER Operations	0608041A / CD1
05	0605053A / FB8: Soldier Borne Sensor (SBS)	0604827A / FK4

05	0605766A / DX9: National Integration To Tactical Systems(MIP)	0605766A / BV3
06	0604256A / 976: Army Threat Sim (ATS)	0604759A / FF1
06	0605898A / XW7: Command HQ - ARI	0605801A / M15
07	0303140A / DV4: Key Management Infrastructure (KMI)	0605144A / BY6
07	0305208A / D07: DCGS-A Common Modules (MIP)	0605148A / BY5
07	0305208A / D07: DCGS-A Common Modules (MIP)	0605224A / CK4
07	0305208A / D07: DCGS-A Common Modules (MIP)	0604037A / BY4
07	0205402A / EF2: Integrated Base Defense	0604785A / DS4
07	0607134A / ES1: Long Range Precision Fires (LRPF)	0605231A / CO3

**Program Terminations (including transfers to Procurement and Sustainment):**

<b><i>Budget Activity</i></b>	<b><i>OSDPE / Project</i></b>	<b><i>Project Title</i></b>
02	0602143A / BB7	Soldier Lethality Technology / Exoskeleton: Technology for Man-Machine Interface
02	0602145A / BF1	Next Generation Combat Vehicle Technology / Autonomous Ground Resupply Tech
02	0602146A / AM6	Network C3I Technology / Modular RF Communications Technology
02	0602146A / AP7	Network C3I Technology / Comms/Horiz Int for Army Mod Priorities Tech
02	0602146A / AQ7	Network C3I Technology / High Tempo Data Driven Decision Tools Technology
02	0602146A / AT2	Network C3I Technology / Subterranean Detection and Monitoring Technology
02	0602146A / AU3	Network C3I Technology / Geospatially Enabled Operational Design Technology
02	0602146A / AW3	Network C3I Technology / DoD PNT M&S Collaborative Initiative (CI) Technolo
02	0602146A / BZ6	Network C3I Technology / Narrowband SATCOM Technology
02	0602150A / AC9	Air and Missile Defense Technology / High Energy Laser Tactical Vehicle Demonstrator Te
02	0602150A / AE4	Air and Missile Defense Technology / Collaborative ISR Sensors Technology
03	0603118A / BB6	Soldier Lethality Advanced Technology / Physical Augmentation: Adv Tech for Field Demo
03	0603462A / BF2	Next Generation Combat Vehicle Advanced Technology / Autonomous Ground Resupply (AGR) Adv Tech
03	0603462A / BG5	Next Generation Combat Vehicle Advanced Technology / Extended Line of Sight (ELOS) Advanced Technology
03	0603462A / BH1	Next Generation Combat Vehicle Advanced Technology / Survivability Systems Controls Advanced Technology

03	0603462A / BK6	Next Generation Combat Vehicle Advanced Technology / Adv Direct InDirect Armament Sys (ADIDAS) Adv Tech
03	0603463A / AN6	Network C3I Advanced Technology / Prot SATCOM-WB Global SATCOM Inter Canc Adv Tech
03	0603463A / AW4	Network C3I Advanced Technology / DoD PNT M&S Collaborative Initiative (CI) Adv Tech
03	0603464A / AE9	Long Range Precision Fires Advanced Technology / Low-Cost Tact Ext Range Missile (LC-TERM) Adv Tech
03	0603466A / AE1	Air and Missile Defense Advanced Technology / Close Combat High Energy Laser Advanced Technology
04	0603639A / 694	Tank and Medium Caliber Ammunition / Medium Caliber Ammunition
04	0603747A / C08	Soldier Support and Survivability / Rapid Equipping Force
04	0603804A / G11	Logistics and Engineer Equipment - Adv Dev / Adv Elec Energy Con Ad
04	0603807A / VS7	Medical Systems - Adv Dev / MEDEVAC Mission Equipment Package (MEP) - Adv Dev
04	0604021A / AW7	Electronic Warfare Technology Maturation (MIP) / Electronic Warfare Technology Maturation (MIP)
04	0604115A / AX4	Technology Maturation Initiatives / Computational Prototyping Environment (CPE)
04	0604115A / AX6	Technology Maturation Initiatives / Active Protection Systems Integration
04	0604115A / AX7	Technology Maturation Initiatives / Multi-Mission High Energy Laser (MMHEL) Sys Demo
04	0604115A / AY1	Technology Maturation Initiatives / MUM-T Platform Enabler
04	0604115A / AY3	Technology Maturation Initiatives / Strategic Long Range Cannon
05	0604622A / VR5	Family of Heavy Tactical Vehicles / TWV Protection Kits
05	0604741A / 149	Air Defense Command, Con trol and Intelligence - Eng Dev / Counter-Rockets, Artillery & Mortar
05	0604768A / 688	Brilliant Anti-Armor Submunition (BAT) / ATACMS BLK II
05	0604780A / 582	Combined Arms Tactical Trainer (CATT) Core / Synthetic Envir Core
05	0604798A / DY5	Brigade Analysis, Integration and Evaluation / Production/Field Coordination for Capability Sets
05	0604802A / 613	Weapons and Munitions - Eng Dev / MORTAR SYSTEMS
05	0604802A / EU5	Weapons and Munitions - Eng Dev / .50 Caliber All-Purpose Tactical cartridge (APTC)
05	0604802A / XT2	Weapons and Munitions - Eng Dev / 40mm Door Breach
05	0604804A / FG4	Logistics and Engineer Equipment - Eng Dev / Ultra-Lightweight Camouflage Net System (ULCANS)
05	0604808A / 415	Landmine Warfare/Barrier - Eng Dev / Mine Neutral/Detection
05	0604854A / HB6	Artillery Systems - EMD / Mobile 155MM Howitzer
05	0605033A / EQ3	Ground-Based Operational Surveillance System - Expeditionary (GBOSS-E) / Grnd-Based Opnl

		Surv Sys -Exped (GBOSS-E)
05	0605053A / FB4	Ground Robotics / Common Robotic Systems
07	0203744A / EB6	Aircraft Modifications/Product Improvement Programs / MQ-1C Gray Eagle MODS
07	0305204A / 123	Tactical Unmanned Aerial Vehicles / Joint Technology Center System Integration

3. **Classification:** This document contains no classified data. Appropriately cleared individuals can obtain further information on Classified/Special Access Programs by contacting the Department of the Army.



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Department of Defense  
 FY 2022 President's Budget  
 Exhibit R-1 FY 2022 President's Budget  
 Total Obligational Authority  
 (Dollars in Thousands)

05 May 2021

<u>Appropriation</u>	<u>FY 2020 Actual*</u>	<u>FY 2021 Enacted**</u>	<u>FY 2022 Request</u>
Research, Development, Test & Eval, Army	12,842,958	14,144,856	12,799,645
Total Research, Development, Test & Evaluation	12,842,958	14,144,856	12,799,645
<u>Other RDT&amp;E Budget Activities Not Included in the Research, Development, Test and Evaluation Title</u>			
Chem Agents & Munitions Destruction	890,830	942,493	1,001,231
Total Not in Research, Development, Test & Evaluation Title	890,830	942,493	1,001,231

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Department of Defense  
 FY 2022 President's Budget  
 Exhibit R-1 FY 2022 President's Budget  
 Total Obligational Authority  
 (Dollars in Thousands)

05 May 2021

Summary Recap of Budget Activities -----	FY 2020 Actual*	FY 2021 Enacted**	FY 2022 Request
Basic Research	557,265	552,521	473,475
Applied Research	1,227,661	1,518,770	914,288
Advanced Technology Development	1,520,145	1,940,015	1,297,437
Advanced Component Development & Prototypes	2,895,592	3,577,387	3,806,330
System Development & Demonstration	3,072,662	2,948,445	3,392,358
Management Support	1,759,840	1,834,218	1,416,698
Operational Systems Development	1,809,793	1,716,794	1,380,248
Software and Digital Technology Pilot Programs		56,706	118,811
Total Research, Development, Test & Evaluation	12,842,958	14,144,856	12,799,645
 Summary Recap of FYDP Programs -----			
General Purpose Forces	733,243	589,525	542,571
Intelligence and Communications	287,081	362,184	280,473
Research and Development	11,434,683	13,058,379	11,911,888
Central Supply and Maintenance	105,885	130,785	61,720
Administration and Associated Activities	61		
Space	274,732		
Classified Programs	7,273	3,983	2,993
Total Research, Development, Test & Evaluation	12,842,958	14,144,856	12,799,645



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Department of Defense  
 FY 2022 President's Budget  
 Exhibit R-1 FY 2022 President's Budget  
 Total Obligational Authority  
 (Dollars in Thousands)

05 May 2021

	FY 2020 Actual*	FY 2021 Enacted**	FY 2022 Request
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<u>Summary Recap of Non-RDT&amp;E Title FYDP Programs</u>			
Central Supply and Maintenance	890,830	942,493	1,001,231
Total Research, Development, Test & Evaluation	890,830	942,493	1,001,231

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Department of the Army  
 FY 2022 President's Budget  
 Exhibit R-1 FY 2022 President's Budget  
 Total Obligational Authority  
 (Dollars in Thousands)

05 May 2021

<u>Summary Recap of Budget Activities</u>	<u>FY 2020 Actual*</u>	<u>FY 2021 Enacted**</u>	<u>FY 2022 Request</u>
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 <u>Summary Recap of FYDP Programs</u>			
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Research and Development	11,434,683	13,058,379	11,911,888
Central Supply and Maintenance	105,885	130,785	61,720
Administration and Associated Activities	61		
Space	274,732		
Classified Programs	7,273	3,983	2,993
Total Research, Development, Test & Evaluation	12,842,958	14,144,856	12,799,645

R-122BAS: FY 2022 President's Budget (Total Base Published Version), as of May 5, 2021 at 15:01:27

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Department of the Army  
 FY 2022 President's Budget  
 Exhibit R-1 FY 2022 President's Budget  
 Total Obligational Authority  
 (Dollars in Thousands)

05 May 2021

Appropriation: 2040A Research, Development, Test & Eval, Army

Line No	Element Number	Program Item	Act	FY 2020 Actual*	FY 2021 Enacted**	FY 2022 Request	Se
1	0601102A	Defense Research Sciences	01	343,481	344,031	297,241	U
2	0601103A	University Research Initiatives	01	85,148	84,697	66,981	U
3	0601104A	University and Industry Research Centers	01	123,654	118,716	94,003	U
4	0601121A	Cyber Collaborative Research Alliance	01	4,982	5,077	5,067	U
5	0601601A	Artificial Intelligence and Machine Learning Basic Research	01			10,183	U
		Basic Research		557,265	552,521	473,475	
6	0602115A	Biomedical Technology	02		11,403	11,925	U
7	0602134A	Counter Improvised-Threat Advanced Studies	02		1,927	1,976	U
8	0602141A	Lethality Technology	02	68,852	117,484	64,126	U
9	0602142A	Army Applied Research	02	30,733	30,757	28,654	U
10	0602143A	Soldier Lethality Technology	02	141,154	201,750	105,168	U
11	0602144A	Ground Technology	02	143,172	158,158	56,400	U
12	0602145A	Next Generation Combat Vehicle Technology	02	255,041	258,351	172,166	U
13	0602146A	Network C3I Technology	02	133,804	202,257	84,606	U
14	0602147A	Long Range Precision Fires Technology	02	117,395	119,007	64,285	U
15	0602148A	Future Verticle Lift Technology	02	94,888	169,536	91,411	U
16	0602150A	Air and Missile Defense Technology	02	93,937	107,584	19,316	U
17	0602180A	Artificial Intelligence and Machine Learning Technologies	02			15,034	U
18	0602181A	All Domain Convergence Applied Research	02			25,967	U
19	0602182A	C3I Applied Research	02			12,406	U
20	0602183A	Air Platform Applied Research	02			6,597	U

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21	0602184A	Soldier Applied Research	02			11,064	U
22	0602213A	C3I Applied Cyber	02	17,351	18,816	12,123	U
23	0602386A	Biotechnology for Materials - Applied Research	02			20,643	U
24	0602785A	Manpower/Personnel/Training Technology	02	20,406	20,399	18,701	U
25	0602787A	Medical Technology	02	110,928	101,341	91,720	U
		Applied Research		1,227,661	1,518,770	914,288	
26	0603002A	Medical Advanced Technology	03	82,256	94,669	43,804	U
27	0603007A	Manpower, Personnel and Training Advanced Technology	03	10,225	11,344	14,273	U
28	0603025A	Army Agile Innovation and Demonstration	03			22,231	U
29	0603040A	Artificial Intelligence and Machine Learning Advanced Technologies	03			909	U
30	0603041A	All Domain Convergence Advanced Technology	03			17,743	U
31	0603042A	C3I Advanced Technology	03			3,151	U
32	0603043A	Air Platform Advanced Technology	03			754	U
33	0603044A	Soldier Advanced Technology	03			890	U
34	0603115A	Medical Development	03		26,711	26,521	U
35	0603116A	Lethality Advanced Technology	03			8,066	U
36	0603117A	Army Advanced Technology Development	03	66,424	62,663	76,815	U
37	0603118A	Soldier Lethality Advanced Technology	03	131,119	151,370	107,966	U
38	0603119A	Ground Advanced Technology	03	136,544	196,055	23,403	U
39	0603134A	Counter Improvised-Threat Simulation	03		24,087	24,747	U
40	0603386A	Biotechnology for Materials - Advanced Research	03			53,736	U

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41	0603457A	C3I Cyber Advanced Development	03	25,492	43,357	31,426	U
42	0603461A	High Performance Computing Modernization Program	03	217,389	221,161	189,123	U
43	0603462A	Next Generation Combat Vehicle Advanced Technology	03	255,386	302,209	164,951	U
44	0603463A	Network C3I Advanced Technology	03	138,937	216,520	155,867	U
45	0603464A	Long Range Precision Fires Advanced Technology	03	196,393	177,142	93,909	U
46	0603465A	Future Vertical Lift Advanced Technology	03	180,163	220,334	179,677	U
47	0603466A	Air and Missile Defense Advanced Technology	03	79,817	175,703	48,826	U
48	0603920A	Humanitarian Demining	03		16,690	8,649	U
		Advanced Technology Development		1,520,145	1,940,015	1,297,437	
49	0603305A	Army Missile Defense Systems Integration	04	59,318	140,195	11,702	U
50	0603308A	Army Space Systems Integration	04		25,584	18,755	U
51	0603327A	Air and Missile Defense Systems Engineering	04	52,672	47,098		U
52	0603619A	Landmine Warfare and Barrier - Adv Dev	04	79,504	56,067	50,314	U
53	0603639A	Tank and Medium Caliber Ammunition	04	72,456	100,367	79,873	U
54	0603645A	Armored System Modernization - Adv Dev	04	138,300	138,685	170,590	U
55	0603747A	Soldier Support and Survivability	04	9,246	5,712	2,897	U
56	0603766A	Tactical Electronic Surveillance System - Adv Dev	04	37,490	182,400	113,365	U
57	0603774A	Night Vision Systems Advanced Development	04	192,530	15,429	18,000	U
58	0603779A	Environmental Quality Technology - Dem/Val	04	19,089	20,906	11,921	U
59	0603790A	NATO Research and Development	04	5,184	4,589	3,777	U
60	0603801A	Aviation - Adv Dev	04	488,397	694,296	1,125,641	U

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61	0603804A	Logistics and Engineer Equipment - Adv Dev	04	7,081	8,587	7,055	U
62	0603807A	Medical Systems - Adv Dev	04	36,307	33,085	22,071	U
63	0603827A	Soldier Systems - Advanced Development	04	25,204	23,184	17,459	U
64	0604017A	Robotics Development	04	80,909	95,367	87,198	U
65	0604019A	Expanded Mission Area Missile (EMAM)	04			50,674	U
66	0604021A	Electronic Warfare Technology Maturation (MIP)	04	23,043	15,034		U
67	0604035A	Low Earth Orbit (LEO) Satellite Capability	04		21,850	19,638	U
68	0604036A	Multi-Domain Sensing System (MDSS) Adv Dev	04			50,548	U
69	0604037A	Tactical Intel Targeting Access Node (TITAN) Adv Dev	04			28,347	U
70	0604100A	Analysis Of Alternatives	04	9,811	9,714	10,091	U
71	0604101A	Small Unmanned Aerial Vehicle (SUAV) (6.4)	04		1,328	926	U
72	0604113A	Future Tactical Unmanned Aircraft System (FTUAS)	04	40,745	57,083	69,697	U
73	0604114A	Lower Tier Air Missile Defense (LTAMD) Sensor	04	364,154	308,805	327,690	U
74	0604115A	Technology Maturation Initiatives	04	171,058	141,109	270,124	U
75	0604117A	Maneuver - Short Range Air Defense (M-SHORAD)	04	41,690	4,813	39,376	U
76	0604119A	Army Advanced Component Development & Prototyping	04	117,335	172,990	189,483	U
77	0604120A	Assured Positioning, Navigation and Timing (PNT)	04		115,688	96,679	U
78	0604121A	Synthetic Training Environment Refinement & Prototyping	04	99,357	112,093	194,195	U
79	0604134A	Counter Improvised-Threat Demonstration, Prototype Development, and Testing	04		13,326	13,379	U
80	0604182A	Hypersonics	04	394,619	832,166	300,928	U
81	0604403A	Future Interceptor	04	1,918		7,895	U

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82	0604531A	Counter - Small Unmanned Aircraft Systems Advanced Development	04			19,148	U
83	0604541A	Unified Network Transport	04	28,478	39,192	35,409	U
84	0604644A	Mobile Medium Range Missile	04	4,794	88,100	286,457	U
85	0604785A	Integrated Base Defense (Budget Activity 4)	04	2,000	2,020	2,040	U
86	0305251A	Cyberspace Operations Forces and Force Support	04	58,611	50,525	52,988	U
87	1206120A	Assured Positioning, Navigation and Timing (PNT)	04	133,307			U
88	1206308A	Army Space Systems Integration	04	100,985			U
		Advanced Component Development & Prototypes		2,895,592	3,577,387	3,806,330	
89	0604201A	Aircraft Avionics	05	8,069	7,011	6,654	U
90	0604270A	Electronic Warfare Development	05	57,090	56,624	30,840	U
91	0604601A	Infantry Support Weapons	05	86,154	88,552	67,873	U
92	0604604A	Medium Tactical Vehicles	05		8,213	11,374	U
93	0604611A	JAVELIN	05	14,377	5,983	7,094	U
94	0604622A	Family of Heavy Tactical Vehicles	05	12,085	22,254	31,602	U
95	0604633A	Air Traffic Control	05	5,543	3,383	4,405	U
96	0604642A	Light Tactical Wheeled Vehicles	05	2,843	4,193	2,055	U
97	0604645A	Armored Systems Modernization (ASM) - Eng Dev	05	273,433	123,992	137,256	U
98	0604710A	Night Vision Systems - Eng Dev	05	135,283	54,234	62,690	U
99	0604713A	Combat Feeding, Clothing, and Equipment	05	7,295	2,734	1,658	U
100	0604715A	Non-System Training Devices - Eng Dev	05	29,785	27,013	26,540	U
101	0604741A	Air Defense Command, Control and Intelligence - Eng Dev	05	70,279	62,058	59,518	U

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102	0604742A	Constructive Simulation Systems Development	05	11,158	9,779	22,331	U
103	0604746A	Automatic Test Equipment Development	05	10,466	5,375	8,807	U
104	0604760A	Distributive Interactive Simulations (DIS) - Eng Dev	05	7,480	7,605	7,453	U
105	0604768A	Brilliant Anti-Armor Submunition (BAT)	05	19,177	24,064		U
106	0604780A	Combined Arms Tactical Trainer (CATT) Core	05	8,861	3,438		U
107	0604798A	Brigade Analysis, Integration and Evaluation	05	29,852	18,737	21,534	U
108	0604802A	Weapons and Munitions - Eng Dev	05	182,119	268,858	309,778	U
109	0604804A	Logistics and Engineer Equipment - Eng Dev	05	105,668	53,676	59,261	U
110	0604805A	Command, Control, Communications Systems - Eng Dev	05	12,077	10,674	20,121	U
111	0604807A	Medical Materiel/Medical Biological Defense Equipment - Eng Dev	05	70,489	51,285	44,424	U
112	0604808A	Landmine Warfare/Barrier - Eng Dev	05	33,881	9,239	14,137	U
113	0604818A	Army Tactical Command & Control Hardware & Software	05	124,749	128,676	162,704	U
114	0604820A	Radar Development	05	91,782	105,271	127,919	U
115	0604822A	General Fund Enterprise Business System (GFEBs)	05	41,119	15,428	17,623	U
116	0604823A	Firefinder	05	16,583	18,278		U
117	0604827A	Soldier Systems - Warrior Dem/Val	05	4,606	6,296	6,454	U
118	0604852A	Suite of Survivability Enhancement Systems - EMD	05	81,899	62,012	106,354	U
119	0604854A	Artillery Systems - EMD	05	20,290	36,187		U
120	0605013A	Information Technology Development	05	89,541	126,498	122,168	U
121	0605018A	Integrated Personnel and Pay System-Army (IPPS-A)	05	97,873	111,078	76,936	U
122	0605028A	Armored Multi-Purpose Vehicle (AMPV)	05	80,381	76,140	35,560	U

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123	0605029A	Integrated Ground Security Surveillance Response Capability (IGSSR-C)	05	6,423			U
124	0605030A	Joint Tactical Network Center (JTNC)	05	15,228	15,671	16,364	U
125	0605031A	Joint Tactical Network (JTN)	05	39,130	30,540	28,954	U
126	0605033A	Ground-Based Operational Surveillance System - Expeditionary (GBOSS-E)	05	3,689	5,758		U
127	0605034A	Tactical Security System (TSS)	05	7,343			U
128	0605035A	Common Infrared Countermeasures (CIRCM)	05	22,226	29,770	16,630	U
129	0605036A	Combating Weapons of Mass Destruction (CWMD)	05	9,589			U
130	0605038A	Nuclear Biological Chemical Reconnaissance Vehicle (NBCRV) Sensor Suite	05	5,805	4,669	7,618	U
131	0605041A	Defensive CYBER Tool Development	05	50,662	28,544	18,892	U
132	0605042A	Tactical Network Radio Systems (Low-Tier)	05	27,236	20,511	28,849	U
133	0605047A	Contract Writing System	05	16,379	22,025	22,960	U
134	0605049A	Missile Warning System Modernization (MWSM)	05	1,475			U
135	0605051A	Aircraft Survivability Development	05	130,211	99,208	65,603	U
136	0605052A	Indirect Fire Protection Capability Inc 2 - Block 1	05	186,369	153,362	233,512	U
137	0605053A	Ground Robotics	05	24,747	12,010	18,241	U
138	0605054A	Emerging Technology Initiatives	05	36,146	294,366	254,945	U
139	0605143A	Biometrics Enabling Capability (BEC)	05			4,326	U
140	0605144A	Next Generation Load Device - Medium	05			15,616	U
141	0605145A	Medical Products and Support Systems Development	05		919	962	U
142	0605148A	Tactical Intel Targeting Access Node (TITAN) EMD	05			54,972	U

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143	0605203A	Army System Development & Demonstration	05	184,410	150,201	122,175	U
144	0605205A	Small Unmanned Aerial Vehicle (SUAV) (6.5)	05		5,780	2,275	U
145	0605224A	Multi-Domain Intelligence	05			9,313	U
146	0605225A	SIO Capability Development	05			22,713	U
147	0605231A	Precision Strike Missile (PrSM)	05			188,452	U
148	0605232A	Hypersonics EMD	05			111,473	U
149	0605233A	Accessions Information Environment (AIE)	05			18,790	U
150	0605450A	Joint Air-to-Ground Missile (JAGM)	05	6,314	7,566	2,134	U
151	0605457A	Army Integrated Air and Missile Defense (AIAMD)	05	211,634	206,850	157,873	U
152	0605531A	Counter - Small Unmanned Aircraft Systems Sys Dev & Demonstration	05			33,386	U
153	0605625A	Manned Ground Vehicle	05	197,304	171,890	225,106	U
154	0605766A	National Capabilities Integration (MIP)	05	7,835	7,670	14,454	U
155	0605812A	Joint Light Tactical Vehicle (JLTV) Engineering and Manufacturing Development Ph	05	7,119	1,678	2,564	U
156	0605830A	Aviation Ground Support Equipment	05	1,596	1,413	1,201	U
157	0303032A	TROJAN - RH12	05	3,936	3,451	3,362	U
158	0303267A	Auctioned Spectrum Relocation Fund	05	7,650			U
159	0303467A	SENSR Spectrum Pipeline SRF	05	251			U
160	0303567A	Non-SENSR Spectrum Pipeline SRF	05	1,236			U
161	0304270A	Electronic Warfare Development	05	18,432	59,755	75,520	U
		System Development & Demonstration		3,072,662	2,948,445	3,392,358	
162	0604256A	Threat Simulator Development	06	41,566	41,486	18,439	U

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163	0604258A	Target Systems Development	06	27,984	35,279	17,404	U
164	0604759A	Major T&E Investment	06	140,946	119,231	68,139	U
165	0605103A	Rand Arroyo Center	06	12,573	12,989	33,126	U
166	0605301A	Army Kwajalein Atoll	06	230,051	221,965	240,877	U
167	0605326A	Concepts Experimentation Program	06	35,403	50,394	79,710	U
168	0605502A	Small Business Innovative Research	06	392,999	369,715		U
169	0605601A	Army Test Ranges and Facilities	06	356,231	390,351	354,227	U
170	0605602A	Army Technical Test Instrumentation and Targets	06	60,170	81,829	49,253	U
171	0605604A	Survivability/Lethality Analysis	06	33,632	36,001	36,389	U
172	0605606A	Aircraft Certification	06	3,319	2,736	2,489	U
173	0605702A	Meteorological Support to RDT&E Activities	06	6,094	6,360	6,689	U
174	0605706A	Materiel Systems Analysis	06	21,233	21,830	21,558	U
175	0605709A	Exploitation of Foreign Items	06	11,168	8,936	13,631	U
176	0605712A	Support of Operational Testing	06	52,280	54,116	55,122	U
177	0605716A	Army Evaluation Center	06	60,474	56,827	65,854	U
178	0605718A	Army Modeling & Sim X-Cmd Collaboration & Integ	06	2,423	2,478	2,633	U
179	0605801A	Programwide Activities	06	56,800	84,510	96,589	U
180	0605803A	Technical Information Activities	06	30,434	25,487	26,808	U
181	0605805A	Munitions Standardization, Effectiveness and Safety	06	52,401	55,648	43,042	U
182	0605857A	Environmental Quality Technology Mgmt Support	06	4,489	1,715	1,789	U
183	0605898A	Army Direct Report Headquarters - R&D - MHA	06	53,320	54,564	52,108	U

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184	0606001A	Military Ground-Based CREW Technology	06	2,053			U
185	0606002A	Ronald Reagan Ballistic Missile Defense Test Site	06	64,311	68,911	80,952	U
186	0606003A	CounterIntel and Human Intel Modernization	06	2,925	5,200	5,363	U
187	0606105A	Medical Program-Wide Activities	06		19,164	39,041	U
188	0606942A	Assessments and Evaluations Cyber Vulnerabilities	06	4,500	6,496	5,466	U
189	0909999A	Financing for Cancelled Account Adjustments	06	61			U
		Management Support		1,759,840	1,834,218	1,416,698	
190	0603778A	MLRS Product Improvement Program	07	14,014	9,786	12,314	U
191	0605024A	Anti-Tamper Technology Support	07	8,141	8,436	8,868	U
192	0607131A	Weapons and Munitions Product Improvement Programs	07	14,222	19,666	22,828	U
193	0607134A	Long Range Precision Fires (LRPF)	07	149,455	100,146		U
194	0607136A	Blackhawk Product Improvement Program	07	22,502	8,300	4,773	U
195	0607137A	Chinook Product Improvement Program	07	164,820	49,409	52,372	U
196	0607139A	Improved Turbine Engine Program	07	197,941	232,159	275,024	U
197	0607142A	Aviation Rocket System Product Improvement and Development	07	1,847	13,421	12,417	U
198	0607143A	Unmanned Aircraft System Universal Products	07	17,386	19,460	4,594	U
199	0607145A	Apache Future Development	07	5,224	52,502	10,067	U
200	0607148A	AN/TPQ-53 Counterfire Target Acquisition Radar System	07			56,681	U
201	0607150A	Intel Cyber Development	07		14,652	3,611	U
202	0607312A	Army Operational Systems Development	07	45,026	35,851	28,029	U
203	0607313A	Electronic Warfare Development	07			5,673	U

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204	0607665A	Family of Biometrics	07	1,576	1,276	1,178	U
205	0607865A	Patriot Product Improvement	07	83,833	178,984	125,932	U
206	0203728A	Joint Automated Deep Operation Coordination System (JADOCs)	07	45,447	43,060	25,547	U
207	0203735A	Combat Vehicle Improvement Programs	07	266,197	213,728	211,523	U
208	0203743A	155mm Self-Propelled Howitzer Improvements	07	191,076	217,959	213,281	U
209	0203744A	Aircraft Modifications/Product Improvement Programs	07	8,896	11,261		U
210	0203752A	Aircraft Engine Component Improvement Program	07	138	80	132	U
211	0203758A	Digitization	07	4,043	4,351	3,936	U
212	0203801A	Missile/Air Defense Product Improvement Program	07	1,235	1,241	127	U
213	0203802A	Other Missile Product Improvement Programs	07		15,268	10,265	U
214	0205412A	Environmental Quality Technology - Operational System Dev	07	10,000	250	262	U
215	0205456A	Lower Tier Air and Missile Defense (AMD) System	07	93,743		182	U
216	0205778A	Guided Multiple-Launch Rocket System (GMLRS)	07	112,468	72,817	63,937	U
217	0208053A	Joint Tactical Ground System	07		9,510	13,379	U
219	0303028A	Security and Intelligence Activities	07	26,674	23,367	24,531	U
220	0303140A	Information Systems Security Program	07	25,710	28,270	15,720	U
221	0303141A	Global Combat Support System	07	57,604	70,652	52,739	U
222	0303142A	SATCOM Ground Environment (SPACE)	07		18,002	15,247	U
223	0303150A	WWMCCS/Global Command and Control System	07	1,988			U
226	0305179A	Integrated Broadcast Service (IBS)	07	459	382	5,430	U
227	0305204A	Tactical Unmanned Aerial Vehicles	07	22,147	38,151	8,410	U

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05 May 2021

Appropriation: 2040A Research, Development, Test & Eval, Army

Line No	Program Element Number	Item	Act	FY 2020 Actual*	FY 2021 Enacted**	FY 2022 Request	Se c
228	0305206A	Airborne Reconnaissance Systems	07	13,177	28,858	24,460	U
229	0305208A	Distributed Common Ground/Surface Systems	07	28,821	40,771		U
230	0305219A	MQ-1C Gray Eagle UAS	07	5,000			U
231	0305232A	RQ-11 UAV	07	3,218			U
232	0305233A	RQ-7 UAV	07	7,817			U
233	0307665A	Biometrics Enabled Intelligence	07	4,350		2,066	U
234	0708045A	End Item Industrial Preparedness Activities	07	105,885	130,785	61,720	U
235	1203142A	SATCOM Ground Environment (SPACE)	07	32,764			U
236	1208053A	Joint Tactical Ground System	07	7,676			U
9999	9999999999	Classified Programs		7,273	3,983	2,993	U
		Operational Systems Development		1,809,793	1,716,794	1,380,248	
237	0608041A	Defensive CYBER - Software Prototype Development	08		56,706	118,811	U
		Software and Digital Technology Pilot Programs			56,706	118,811	
Total Research, Development, Test & Eval, Army				12,842,958	14,144,856	12,799,645	

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Department of the Army  
 FY 2022 President's Budget  
 Exhibit R-1 FY 2022 President's Budget  
 Non RDT&E Title  
 (Dollars in Thousands)

05 May 2021

<u>Summary Recap of Budget Activities</u>	<u>FY 2020 Actual*</u>	<u>FY 2021 Enacted**</u>	<u>FY 2022 Request</u>
Research, Development, Test, And Evaluation	890,830	942,493	1,001,231
Total Research, Development, Test & Evaluation	890,830	942,493	1,001,231
<u>Summary Recap of Non-RDT&amp;E Title FYDP Programs</u>			
Central Supply and Maintenance	890,830	942,493	1,001,231
Total Research, Development, Test & Evaluation	890,830	942,493	1,001,231

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Department of the Army  
 FY 2022 President's Budget  
 Exhibit R-1 FY 2022 President's Budget  
 Non RDT&E Title  
 (Dollars in Thousands)

05 May 2021

Appropriation: 0390D Chem Agents & Munitions Destruction

Line No	Program Element Number	Item	Act	FY 2020 Actual*	FY 2021 Enacted**	FY 2022 Request	S e c
1	0708081D	Chemical Materials Agency	02	6,500	6,494	6,220	U
2	0708083D	Assembled Chemical Weapons Alternatives	02	884,330	935,999	995,011	U
		Research, Development, Test, And Evaluation		890,830	942,493	1,001,231	
Total Chem Agents & Munitions Destruction				890,830	942,493	1,001,231	



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**Program Element Table of Contents (by Budget Activity then Line Item Number)**

***Appropriation 2040: Research, Development, Test & Evaluation, Army***

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49	04	0603305A	Army Missile Defense Systems Integration.....	Volume 2a - 1
50	04	0603308A	Army Space Systems Integration.....	Volume 2a - 17
51	04	0603327A	Air and Missile Defense Systems Engineering.....	Volume 2a - 31
52	04	0603619A	Landmine Warfare and Barrier - Adv Dev.....	Volume 2a - 40
53	04	0603639A	Tank and Medium Caliber Ammunition.....	Volume 2a - 74
54	04	0603645A	Armored System Modernization - Adv Dev.....	Volume 2a - 147
55	04	0603747A	Soldier Support and Survivability.....	Volume 2a - 159
56	04	0603766A	Tactical Electronic Surveillance System - Adv Dev.....	Volume 2a - 174
57	04	0603774A	Night Vision Systems Advanced Development.....	Volume 2a - 199
58	04	0603779A	Environmental Quality Technology - Dem/Val.....	Volume 2a - 220
59	04	0603790A	NATO Research and Development.....	Volume 2a - 237
60	04	0603801A	Aviation - Adv Dev.....	Volume 2a - 249
61	04	0603804A	Logistics and Engineer Equipment - Adv Dev.....	Volume 2a - 271
62	04	0603807A	Medical Systems - Adv Dev.....	Volume 2a - 293
63	04	0603827A	Soldier Systems - Advanced Development.....	Volume 2a - 327
64	04	0604017A	Robotics Development.....	Volume 2a - 368

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***Appropriation 2040: Research, Development, Test & Evaluation, Army***

<b>Line #</b>	<b>Budget Activity</b>	<b>Program Element Number</b>	<b>Program Element Title</b>	<b>Page</b>
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66	04	0604021A	Electronic Warfare Technology Maturation (MIP).....	Volume 2a - 407
67	04	0604035A	Low Earth Orbit (LEO) Satellite Capability.....	Volume 2a - 415
68	04	0604036A	Multi-Domain Sensing System (MDSS) Adv Dev.....	Volume 2a - 425
69	04	0604037A	Tactical Intel Targeting Access Node (TITAN) Adv Dev.....	Volume 2a - 433
70	04	0604100A	Analysis Of Alternatives.....	Volume 2a - 442
71	04	0604101A	Small Unmanned Aerial Vehicle (SUAV) (6.4).....	Volume 2a - 448
72	04	0604113A	Future Tactical Unmanned Aircraft System (FTUAS).....	Volume 2a - 457
73	04	0604114A	Lower Tier Air Missile Defense (LTAMD) Sensor.....	Volume 2a - 467
74	04	0604115A	Technology Maturation Initiatives.....	Volume 2a - 475
75	04	0604117A	Maneuver - Short Range Air Defense (M-SHORAD).....	Volume 2a - 537
76	04	0604119A	Army Advanced Component Development & Prototyping.....	Volume 2a - 549
77	04	0604120A	Assured Positioning, Navigation and Timing (PNT).....	Volume 2a - 550
78	04	0604121A	Synthetic Training Environment Refinement & Prototyping.....	Volume 2a - 579
79	04	0604134A	Counter Improvised-Threat Demonstration, Prototype Development, and Testing.....	Volume 2a - 629
80	04	0604182A	Hypersonics.....	Volume 2a - 639
81	04	0604403A	Future Interceptor.....	Volume 2a - 652
82	04	0604531A	Counter - Small Unmanned Aircraft Systems Advanced Development.....	Volume 2a - 658

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***Appropriation 2040: Research, Development, Test & Evaluation, Army***

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<b>Line #</b>	<b>Budget Activity</b>	<b>Program Element Number</b>	<b>Program Element Title</b>	<b>Page</b>
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84	04	0604644A	Mobile Medium Range Missile.....	Volume 2a - 702
85	04	0604785A	Integrated Base Defense (Budget Activity 4).....	Volume 2a - 712
86	04	0305251A	Cyberspace Operations Forces and Force Support.....	Volume 2a - 719
87	04	1206120A	Assured Positioning, Navigation and Timing (PNT).....	Volume 2a - 730
88	04	1206308A	Army Space Systems Integration.....	Volume 2a - 757

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Analysis Of Alternatives	0604100A	70	04.....	Volume 2a - 442
Armored System Modernization - Adv Dev	0603645A	54	04.....	Volume 2a - 147
Army Advanced Component Development & Prototyping	0604119A	76	04.....	Volume 2a - 549
Army Missile Defense Systems Integration	0603305A	49	04.....	Volume 2a - 1
Army Space Systems Integration	0603308A	50	04.....	Volume 2a - 17
Army Space Systems Integration	1206308A	88	04.....	Volume 2a - 757
Assured Positioning, Navigation and Timing (PNT)	0604120A	77	04.....	Volume 2a - 550
Assured Positioning, Navigation and Timing (PNT)	1206120A	87	04.....	Volume 2a - 730
Aviation - Adv Dev	0603801A	60	04.....	Volume 2a - 249
Counter - Small Unmanned Aircraft Systems Advanced Development	0604531A	82	04.....	Volume 2a - 658
Counter Improvised-Threat Demonstration, Prototype Development, and Testing	0604134A	79	04.....	Volume 2a - 629
Cyberspace Operations Forces and Force Support	0305251A	86	04.....	Volume 2a - 719
Electronic Warfare Technology Maturation (MIP)	0604021A	66	04.....	Volume 2a - 407
Environmental Quality Technology - Dem/Val	0603779A	58	04.....	Volume 2a - 220
Expanded Mission Area Missile (EMAM)	0604019A	65	04.....	Volume 2a - 395
Future Interceptor	0604403A	81	04.....	Volume 2a - 652

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<b>Program Element Title</b>	<b>Program Element Number</b>	<b>Line #</b>	<b>BA</b>	<b>Page</b>
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Hypersonics	0604182A	80	04.....	Volume 2a - 639
Integrated Base Defense (Budget Activity 4)	0604785A	85	04.....	Volume 2a - 712
Landmine Warfare and Barrier - Adv Dev	0603619A	52	04.....	Volume 2a - 40
Logistics and Engineer Equipment - Adv Dev	0603804A	61	04.....	Volume 2a - 271
Low Earth Orbit (LEO) Satellite Capability	0604035A	67	04.....	Volume 2a - 415
Lower Tier Air Missile Defense (LTAMD) Sensor	0604114A	73	04.....	Volume 2a - 467
Maneuver - Short Range Air Defense (M-SHORAD)	0604117A	75	04.....	Volume 2a - 537
Medical Systems - Adv Dev	0603807A	62	04.....	Volume 2a - 293
Mobile Medium Range Missile	0604644A	84	04.....	Volume 2a - 702
Multi-Domain Sensing System (MDSS) Adv Dev	0604036A	68	04.....	Volume 2a - 425
NATO Research and Development	0603790A	59	04.....	Volume 2a - 237
Night Vision Systems Advanced Development	0603774A	57	04.....	Volume 2a - 199
Robotics Development	0604017A	64	04.....	Volume 2a - 368
Small Unmanned Aerial Vehicle (SUAV) (6.4)	0604101A	71	04.....	Volume 2a - 448
Soldier Support and Survivability	0603747A	55	04.....	Volume 2a - 159
Soldier Systems - Advanced Development	0603827A	63	04.....	Volume 2a - 327
Synthetic Training Environment Refinement & Prototyping	0604121A	78	04.....	Volume 2a - 579
Tactical Electronic Surveillance System - Adv Dev	0603766A	56	04.....	Volume 2a - 174

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<b>Program Element Title</b>	<b>Program Element Number</b>	<b>Line #</b>	<b>BA</b>	<b>Page</b>
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Tank and Medium Caliber Ammunition	0603639A	53	04.....	Volume 2a - 74
Technology Maturation Initiatives	0604115A	74	04.....	Volume 2a - 475
Unified Network Transport	0604541A	83	04.....	Volume 2a - 671

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**Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Army** **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040: <i>Research, Development, Test &amp; Evaluation, Army / BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0603305A / <i>Army Missile Defense Systems Integration</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	-	59.318	140.195	11.702	-	11.702	-	-	-	-	-	-
TR5: <i>Missile Defense Battlelab</i>	-	59.318	140.195	11.702	-	11.702	-	-	-	-	-	-

**A. Mission Description and Budget Item Justification**

This Program Element (PE) funds missile defense systems integration efforts for the US Army Space and Missile Defense Command in its role as the Army Service Component Command (ASCC) to USSTRATCOM and USSPACECOM.

USASMDC: Headquarters, Department of the Army General Order 37, dated 16 October 2006, designated USASMDC as the Army proponent for ground-based midcourse defense (GMD), the Army integrator for global missile defense, and the ASCC of the U.S. Strategic Command (USSTRATCOM). Upon its establishment, USASMDC became the ASCC of the United States Space Command (USSPACECOM). Army Regulation (AR) 10-87 Army Commands, Army Service Component Commands, and Direct Reporting Units, dated 4 September 2007 and AR 5-22 The Army Force Modernization Proponent System dated 19 August 2009 designates USASMDC as the Army specified proponent for Global Missile Defense (GMD) capabilities. As the Army proponent for GMD, USASMDC is responsible for developing warfighting concepts, conducting warfighting experiments to validate those concepts, identifying capabilities needed to implement the validated concepts, and developing Doctrine, Organizations, Training, Material, Leadership & Education, Personnel, Facilities and Policy (DOTMLPF-P) solutions to realize GMD capabilities. As the Army integrator for global missile defense, USASMDC is responsible for reviewing programs managed by the Army, other Services, Defense agencies and National agencies to ensure that they are correctly synchronized and will ultimately provide the capabilities required by USSTRATCOM and USSPACECOM to execute their global missile defense responsibilities.

<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022 Base</b>	<b>FY 2022 OCO</b>	<b>FY 2022 Total</b>
Previous President's Budget	59.487	11.062	11.651	-	11.651
Current President's Budget	59.318	140.195	11.702	-	11.702
Total Adjustments	-0.169	129.133	0.051	-	0.051
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	129.250			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.169	-0.117			
• Adjustments to Budget Years	-	-	0.051	-	0.051

**Congressional Add Details (\$ in Millions, and Includes General Reductions)**

**Project:** TR5: *Missile Defense Battlelab*

FY 2020	FY 2021

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2022 Army **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040: <i>Research, Development, Test &amp; Evaluation, Army / BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0603305A / <i>Army Missile Defense Systems Integration</i>
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<b>Congressional Add Details (\$ in Millions, and Includes General Reductions)</b>	<b>FY 2020</b>	<b>FY 2021</b>
Congressional Add: <i>Conventional Mission Capabilities</i>	3.000	-
Congressional Add: <i>Hypersonic Advanced Technology Testbed</i>	15.000	-
Congressional Add: <i>Integrated Environmental Control and Power</i>	8.000	-
Congressional Add: <i>Pragmatic Artificial Intelligence and new Technology Laboratory</i>	7.500	-
Congressional Add: <i>Hypersonic Testing and Related Technology Development</i>	15.000	-
Congressional Add: <i>Program increase - pragmatic artificial intelligence and new technology</i>	-	10.500
Congressional Add: <i>Program increase - integrated environmental control and power</i>	-	16.000
Congressional Add: <i>Program increase - hot air tunnel and MESO technologies for hypersonics</i>	-	47.000
Congressional Add: <i>Program increase - conventional mission capabilities</i>	-	10.250
Congressional Add: <i>Program increase - air and missile system critical technology development</i>	-	12.000
Congressional Add: <i>Program increase - advanced technology end?to?end testbed</i>	-	10.500
Congressional Add: <i>Program increase - gun launched interceptors</i>	-	8.000
Congressional Add: <i>Program increase</i>	-	15.000
Congressional Add Subtotals for Project: TR5	48.500	129.250
Congressional Add Totals for all Projects	48.500	129.250

**Change Summary Explanation**

Funding additions for FERS Civ Pay.

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**Exhibit R-2A, RDT&E Project Justification:** PB 2022 Army **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603305A / Army Missile Defense Systems Integration	<b>Project (Number/Name)</b> TR5 / Missile Defense Battlelab
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
TR5: <i>Missile Defense Battlelab</i>	-	59.318	140.195	11.702	-	11.702	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

**A. Mission Description and Budget Item Justification**

This Project TR5 funds United States Army Space and Missile Defense Command (USASMDC) efforts to develop the associated operational prototyping, experimentation, operational analysis, and modeling and simulation in support of missile defense capabilities for current and future Forces.

USASMDC: Headquarters, Department of the Army General Order 37, dated 16 October 2006, designated USASMDC as the Army proponent for ground-based midcourse defense (GMD), the Army integrator for global missile defense, and the Army Service Component Command (ASCC) of the U.S. Strategic Command (USSTRATCOM). Upon its establishment, USASMDC became the ASCC of the United States Space Command (USSPACECOM). Army Regulation (AR) 10-87 Army Commands, Army Service Component Commands, and Direct Reporting Units, dated 4 September 2007 and AR 5-22 The Army Force Modernization Proponent System dated 19 August 2009 designates USASMDC as the Army specified proponent for Global Missile Defense. As the Army proponent for GMD, USASMDC is responsible for developing warfighting concepts, conducting warfighting experiments to validate those concepts, identifying capabilities needed to implement the validated concepts, and developing Doctrine, Organizations, Training, Material, Leadership & Education, Personnel, Facilities and Policy (DOTMLPF-P) solutions to realize GMD capabilities. As the Army integrator for global missile defense, USASMDC is responsible for reviewing programs managed by the Army, other Services, Defense agencies and National agencies to ensure that they are correctly synchronized and will ultimately provide the capabilities required by USSTRATCOM and USSPACECOM to execute their global missile defense responsibilities.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	FY 2020	FY 2021	FY 2022
<b>Title:</b> Prototypes	6.573	6.623	7.106
<p><b>Description:</b> Funding is provided to continue to evaluate new technologies in realistic operating environments. This is accomplished by participating in and providing support to Unified Quest wargames and experiments to analyze and integrate technology to identify the feasibility integration into Army missile defense systems. The Space and Missile Defense Command will participate and support biennial rewrites of Army Capstone, Operational and Functional Concepts. Funding also continues operational manager support to STRATCOM, NORTHCOM and SOCOM Joint Technical Capability Demonstrations to ensure Army missile defense equities are represented in advanced technology developments by demonstrating military utility when applied to military equipment and techniques. Examples include: supporting multi service experiments and capability development of the national-directed Phased Adaptive Approach (PAA) for Ballistic Missile Defense (BMD) as it is applied to each of the regional COCOMs; Developing effective Integrated Missile Defense concepts for Army support to the Phased Adaptive Approach (PAA) being implemented within each regional COCOM. A focus area will be informing the Missile Defeat Integrated Capability Development Working Group with experimentation on improving the timeliness and effectiveness of counter ballistic missile time sensitive targeting. Continue to support TRADOC proponents with their responsibilities relative to</p>			

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603305A / <i>Army Missile Defense Systems Integration</i>	<b>Project (Number/Name)</b> TR5 / <i>Missile Defense Battlelab</i>

**B. Accomplishments/Planned Programs (\$ in Millions)**

doctrine, organization, training, material, leader development and education, personnel, and facilities (DOTMLPF-P) plus related matters to continue missile defense proponent input to Joint Capabilities Integration and Development System (JCIDS), Science and Technology, Concept Development, and Capability Development. Provide Government program management and oversight for DOTMLPF-P development and analysis for missile defense-related programs for which USASMDC is the Army's proponent - Ground-based Midcourse Defense System, the Army Navy/Transportable Radar Surveillance and Control Model 2 (AN/TPY-2) Forward-based Mode Radar (FBM), and Army- specific applications of the Command and Control, Battle Management and Communications program. Provide Government program management and oversight for National Capital Region's Integrated Air Defense System.

***FY 2021 Plans:***

Taking lessons learned from the FY 2020 efforts to continue to evaluate new technologies in realistic operating environments. This is accomplished by participating in and providing support to Unified Quest wargames and experiments to analyze and integrate technology to identify the feasibility integration into Army missile defense systems. The Space and Missile Defense Command is participating in and providing biennial rewrites of Army Capstone, Operational and Functional Concepts. Continuing to provide operational manager support to USSTRATCOM, USNORTHCOM and USSOCOM Joint Technical Capability Demonstrations to ensure Army missile defense equities are represented in advanced technology developments by demonstrating military utility when applied to military equipment and techniques. Examples include: supporting multi service experiments and capability development of the national-directed Phased Adaptive Approach (PAA) for Ballistic Missile Defense (BMD) as it is applied to each of the regional CCMDs; developing effective Integrated Missile Defense concepts for Army support to the Phased Adaptive Approach (PAA) being implemented within each regional CCMD. A focus area will be improving upon the Missile Defeat Integrated Capability Development Working Group formed in FY 2020 with additional experimentation aimed at further improving the timeliness and effectiveness of counter ballistic missile time sensitive targeting. Continuing support to TRADOC proponents with their responsibilities relative to doctrine, organization, training, material, leader development and education, personnel, facilities and policy (DOTMLPF-P) plus related matters to continue missile defense proponent input to Joint Capabilities Integration and Development System (JCIDS), Science and Technology, Concept Development, and Capability Development. Provide Government program management and oversight for DOTMLPF-P development and analysis for missile defense-related programs for which USASMDC is the Army's proponent - Ground-based Midcourse Defense System, the Army Navy/Transportable Radar Surveillance and Control Model 2 (AN/TPY-2) Forward-based Mode Radar (FBM), and Army- specific applications of the Command and Control, Battle Management and Communications program. Specifically, providing support to Ground-based Midcourse Defense (GMD) Missile Field #4 (MF4) development and construction. Providing support to recapitalized MEP-810C generator fielding and radar site power conversion activities in USINDOPACOM AOR. Providing Hardened Transportable Terminal fielding to USCENTCOM, USINDOPACOM, and USEUCOM AORs and continue to support C2BMC software development, integration, fielding, and operations & sustainment activities. Providing Government program management and oversight for National Capital Region's Integrated Air Defense System.

FY 2020	FY 2021	FY 2022

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603305A / <i>Army Missile Defense Systems Integration</i>	<b>Project (Number/Name)</b> TR5 / <i>Missile Defense Battlelab</i>

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
<p>These funds are being executed by USASMDC, Center of Excellence in FY 2021.</p> <p><b>FY 2022 Plans:</b>                      Take the lessons learned from the FY 2021 efforts to continue to evaluate new technologies in realistic operating environments. This is accomplished by participating in and providing support to Unified Quest wargames and experiments to analyze and integrate technology to identify the feasibility integration into Army missile defense systems. The Space and Missile Defense Command will participate and support biennial rewrites of Army Capstone, Operational and Functional Concepts. Continue to provide operational manager support to USSTRATCOM, USNORTHCOM and USSOCOM Joint Technical Capability Demonstrations to ensure Army missile defense equities are represented in advanced technology developments by demonstrating military utility when applied to military equipment and techniques. Examples include: supporting multi service experiments and capability development of the national-directed Phased Adaptive Approach (PAA) for Ballistic Missile Defense (BMD) as it is applied to each of the regional CCMs; developing effective Integrated Missile Defense concepts for Army support to the Phased Adaptive Approach (PAA) being implemented within each regional CCM. A focus area will be improving upon the Missile Defeat Integrated Capability Development Working Group formed in FY 2020 with additional experimentation aimed at further improving the timeliness and effectiveness of counter ballistic missile time sensitive targeting. Continue support to TRADOC proponents with their responsibilities relative to doctrine, organization, training, material, leader development and education, personnel, facilities and policy (DOTMLPF-P) plus related matters to continue missile defense proponent input to Joint Capabilities Integration and Development System (JCIDS), Science and Technology, Concept Development, and Capability Development. Provide Government program management and oversight for DOTMLPF-P development and analysis for missile defense-related programs for which USASMDC is the Army's proponent - Ground-based Midcourse Defense System, the Army Navy/Transportable Radar Surveillance and Control Model 2 (AN/TPY-2) Forward-based Mode Radar (FBM), and Army-specific applications of the Command and Control, Battle Management and Communications program. Specifically, provide support to Ground-based Midcourse Defense (GMD) Missile Field #4 (MF4) development and construction. Provide support to recapitalized MEP-810C generator fielding and radar site power conversion activities in USINDOPACOM AOR. Provide Hardened Transportable Terminal fielding to USCENTCOM, USINDOPACOM, and USEUCOM AORs and continue to support C2BMC software development, integration, fielding, and operations &amp; sustainment activities. Provide Government program management and oversight for National Capital Region's Integrated Air Defense System.</p> <p><b>FY 2021 to FY 2022 Increase/Decrease Statement:</b>                      Moderate funding increases in FY22 reflect civilian workforce pay increases and increased cost for highly technical support for experimentation, demonstration and capability development in the air and missile defense domain.</p>			
<p><b>Title:</b> Analysis, and Models and Simulations (M&amp;S)</p> <p><b>Description:</b> Funding is provided to evaluate new technologies in realistic operating environments. This will be accomplished by supporting ongoing efforts that provide the most realistic operating environment available to perform technology gap and</p>	4.245	4.322	4.596

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603305A / <i>Army Missile Defense Systems Integration</i>	<b>Project (Number/Name)</b> TR5 / <i>Missile Defense Battlelab</i>

**B. Accomplishments/Planned Programs (\$ in Millions)**

	FY 2020	FY 2021	FY 2022
<p>cost reduction analysis of missile defense systems. Realistic operating environments will be available to determine the ability of the specific technologies to fill capability gaps in terms of utility to the warfighter. Support of technology demonstrations, Analysis and Demonstration Tools/Test Beds for evolving missile defense concepts will address emerging needs and continue to be expanded to ensure that advanced technology development can adequately enhance missile defense capabilities. The Space and Missile Defense Center of Excellence (SMD CoE) will continue to provide program management for maintenance, sustainment, and development for Extended Air Defense Simulation (EADSIM) delivering the required high fidelity synthetic operating environment to provide the capability to perform system and cost benefit analysis, operational planning, and exercise/experimentation support. The SMD CoE will continue to provide program management for maintenance, sustainment, and development for Reconfigurable Tactical Operations Simulator (RTOS) delivering operator in the loop capability for air and missile defense simulation in distributed exercises and experiments. The SMD COE will continue to provide program management for maintenance, sustainment, and development for the Joint Embedded Messaging System (JEMS) providing data translation application that enables communications between disparate systems, protocols and architectures.</p> <p><b>FY 2021 Plans:</b> Take the lessons learned from the FY 2020 efforts and evaluate new technologies in realistic operating environments. This will be accomplished by supporting ongoing efforts that provide the most realistic operating environment available to perform technology gap and cost reduction analysis of missile defense systems. Realistic operating environments will be available to determine the ability of the specific technologies to fill capability gaps in terms of utility to the warfighter. Support of technology demonstrations, Analysis and Demonstration Tools/Test Beds for evolving missile defense concepts will address emerging needs and continue to be expanded to ensure that advanced technology development can adequately enhance missile defense capabilities. The Space and Missile Defense Center of Excellence (SMD CoE) will continue to provide program management for maintenance, sustainment, and development for Extended Air Defense Simulation (EADSIM) delivering the required high fidelity synthetic operating environment to provide the capability to perform system and cost benefit analysis, operational planning, and exercise/experimentation support. The SMD CoE will continue to provide program management for maintenance, sustainment, and development for Reconfigurable Tactical Operations Simulator (RTOS) and Future Force Experimentation Air Defense Simulation (FFEADS) delivering operator in the loop capability for air and missile defense simulation in distributed exercises and experiments. The SMD CoE will continue to provide program management for maintenance, sustainment, and development for the Joint Embedded Messaging System (JEMS) providing data translation application that enables communications between disparate systems, protocols and architectures. These funds will be executed by USASMDC SMD CoE.</p> <p><b>FY 2022 Plans:</b> Take the lessons learned from the FY 2021 efforts and continue to evaluate new technologies in realistic operating environments. This will be accomplished by supporting ongoing efforts that provide the most realistic operating environment available to perform technology gap and cost reduction analysis of missile defense systems. Realistic operating environments will be available to</p>			

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603305A / Army Missile Defense Systems Integration	<b>Project (Number/Name)</b> TR5 / Missile Defense Battlelab

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
determine the ability of the specific technologies to fill capability gaps in terms of utility to the warfighter. Support of technology demonstrations, Analysis and Demonstration Tools/Test Beds for evolving missile defense concepts will address emerging needs and continue to be expanded to ensure that advanced technology development can adequately enhance missile defense capabilities. The Space and Missile Defense Center of Excellence (SMD CoE) will continue to provide program management for maintenance, sustainment, and development for Extended Air Defense Simulation (EADSIM) delivering the required high fidelity synthetic operating environment to provide the capability to perform system and cost benefit analysis, operational planning, and exercise/ experimentation support. The SMD CoE will continue to provide program management for maintenance, sustainment, and development for Reconfigurable Tactical Operations Simulator (RTOS) and Future Force Experimentation Air Defense Simulation (FFEADS) delivering operator in the loop capability for air and missile defense simulation in distributed exercises and experiments. The SMD CoE will continue to provide program management for maintenance, sustainment, and development for for the Joint Embedded Messaging System (JEMS) providing data translation application that enables communications between disparate systems, protocols and architectures. These funds will be executed by USASMDC SMD CoE.			
<b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> Moderate funding increases in FY22 reflect civilian workforce pay increases and increased cost for highly technical support for experimentation, demonstration and capability development in the air and missile defense domain.			
<b>Accomplishments/Planned Programs Subtotals</b>	10.818	10.945	11.702

	<b>FY 2020</b>	<b>FY 2021</b>
<b>Congressional Add:</b> Conventional Mission Capabilities	3.000	-
<b>FY 2020 Accomplishments:</b> Conventional Mission Capabilities: The Space and Missile Defense Technical Center (SMDTC) matured rapid mission planning and range safety capabilities leveraging existing, proven, and low-risk systems. These efforts integrated and developed software tools for trajectory propagation, aerothermal analysis, flight guidance, system vulnerability, and real-time weather. The effort supported test in the Air and Missile Software Integration Laboratory (AMSIL) to meet the near and long-term advances in Integrated Air and Missile Defense (IAMD) system requirements including the Long Range Hypersonic Weapon (LRHW). The SMDTC continued the development of a mission planner supporting detailed flight planning of emerging weapon systems including the LRHW. This planner combined high fidelity vehicle flight dynamics, aerothermal analyses, signature analyses, and environmental analyses (including real-time and predicted weather) with a comprehensive human/machine interface (HMI) and visualization capability. The SMDTC augmented the planner with Range Commanders Council (RCC)-321 compliant tools enabling hazard analysis. Initiated adding		

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army		<b>Date:</b> May 2021	
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603305A / Army Missile Defense Systems Integration	<b>Project (Number/Name)</b> TR5 / Missile Defense Battlelab	
		<b>FY 2020</b>	<b>FY 2021</b>
capabilities for link margin analyses for telemetry, radar, and flight termination systems. Initiated integration of capability within the AMSIL			
<b>Congressional Add:</b> Hypersonic Advanced Technology Testbed		15.000	-
<b>FY 2020 Accomplishments:</b> Hypersonic Advanced Technology Testbed: The Space and Missile Defense Technical Center (SMDTC) initiated the establishment a Hypersonic Advanced Technology Testbed simulation and test capability to replicate realistic flight in 3 and 6 Degrees of Freedom (DOF) dynamic environments for advanced weapon systems. The capability supported the assessment of effect of these environments on critical subsystems, including the state-of-the-art Integrated Air and Missile Defense (IAMD) seekers/sensors, avionics guidance computers, and inertial measurement units (IMU). The testbed leveraged the latest advances in piezoelectric shakers and controllers for true flight-like environments for instrumentation. Initiated technical simulations of advanced IAMD threat sand capabilities to assess system task plans, and engagement plans (e.g. 3DOF, 6DOF) with possible use for ground tests.			
<b>Congressional Add:</b> Integrated Environmental Control and Power		8.000	-
<b>FY 2020 Accomplishments:</b> Integrated Environmental Control and Power: The Space and Missile Defense Technical Center (SMDTC) continued development, testing and evaluation, and pre-production reliability testing of integrated power and thermal management technologies, components, and systems. The effort integrated thermal and power management sub-systems to refine and mature advanced platforms of Counter-Unmanned Aircraft System (C-UAS) needs of advanced weapon pods or small stationary container systems to more effectively operate and contribute to Integrated Air and Missile Defense/Short Range Air Defense (IAMD) objectives. The effort built upon the advanced high efficiency Alternating Current (AC) and Direct Current (DC) compatible Environmental Control Unit and electronics cooling technologies allowing for the rapid integration of highly compact and energy efficient DC generators.			
<b>Congressional Add:</b> Pragmatic Artificial Intelligence and new Technology Laboratory		7.500	-
<b>FY 2020 Accomplishments:</b> Pragmatic Artificial Intelligence and new Technology Laboratory: The Space and Missile Defense Technical Center (SMDTC) initiated the Pragmatic Artificial Intelligence and New Technology (PAINT) laboratory capability to apply Artificial Intelligence (AI) ?Expert Systems? and other new technologies to Integrated Air and Missile Defense (IAMD) capabilities. The effort began applications of expert computer systems capturing human knowledge and incorporate it into a bounded, autonomous software program. The effort developed methodologies, decision making criteria, lessons learned by IAMD subject matter experts (SMEs), and encode them into the command and control software applications. The PAINT effort focused on			



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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army		<b>Date:</b> May 2021	
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603305A / <i>Army Missile Defense Systems Integration</i>	<b>Project (Number/Name)</b> TR5 / <i>Missile Defense Battlelab</i>	
		<b>FY 2020</b>	<b>FY 2021</b>
applications of basic AI principals to impact the speed and accuracy of software for the benefit of testing IAMD systems in a lab environment such as exercise and test safety and operational planning.			
<b>Congressional Add:</b> Hypersonic Testing and Related Technology Development		15.000	-
<b>FY 2020 Accomplishments:</b> Hypersonic Testing and Related Technology Development: The Space and Missile Defense Technical Center (SMDTC) initiated the to design and development of a full duration test laboratory capability for High Speed/Hypersonic (HS/H) systems. The test confirmed design margins for a test capability for testing HS/H systems in a validated realistic environment. This test supported design refinements of capabilities related to the use of nitrous oxide for non-vitiated hot air flow used in HS/H engine testing. The Hypersonic Testing and Related Technology began development of a full duration test laboratory capability for HS/H systems. The effort validated safety and chemistry requirements for HS/H systems in a validated realistic environment.			
<b>Congressional Add:</b> Program increase - pragmatic artificial intelligence and new technology		-	10.500
<b>FY 2021 Plans:</b> FY21 Pragmatic Artificial Intelligence and new Technology Laboratory: The Space and Missile Defense Technical Center (SMDTC) initiated the Pragmatic Artificial Intelligence and New Technology (PAINT) laboratory capability to apply Artificial Intelligence (AI) ?Expert Systems? and other new technologies to Integrated Air and Missile Defense (IAMD) capabilities. The effort began applications of expert computer systems capturing human knowledge and incorporate it into a bounded, autonomous software program. The effort develops methodologies, decision making criteria, lessons learned by IAMD subject matter experts (SMEs), and encode them into the command and control software applications. The PAINT effort focuses on applications of basic AI principals to impact the speed and accuracy of software for the benefit of testing IAMD systems in a lab environment such as exercise and test safety and operational planning.			
<b>Congressional Add:</b> Program increase - integrated environmental control and power		-	16.000
<b>FY 2021 Plans:</b> FY21 Integrated Environmental Control and Power: The Space and Missile Defense Technical Center (SMDTC) continue the development, testing and evaluation, and pre-production reliability testing of integrated power and thermal management technologies, components, and systems. The effort integrated thermal and power management sub-systems to refine and mature advanced platforms of Counter-Unmanned Aircraft System (C-UAS) needs of advanced weapon pods or small stationary container systems to more effectively operate and contribute to Integrated Air and Missile Defense/Short Range Air Defense (IAMD) objectives. The effort built upon the advanced high efficiency Alternating Current (AC) and Direct Current (DC)			

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army		<b>Date:</b> May 2021	
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603305A / Army Missile Defense Systems Integration	<b>Project (Number/Name)</b> TR5 / Missile Defense Battlelab	
		<b>FY 2020</b>	<b>FY 2021</b>
compatible Environmental Control Unit and electronics cooling technologies allowing for the rapid integration of highly compact and energy efficient DC generators.			
<b>Congressional Add:</b> Program increase - hot air tunnel and MESO technologies for hypersonics		-	47.000
<b>FY 2021 Plans:</b> FY21 Hypersonic Testing and Related Technology Development: The Space and Missile Defense Technical Center (SMDTC) will initiate the design and development of a test laboratory capability for High Speed/Hypersonic (HS/H) systems. The test will confirm design margins for a test capability for testing HS/H systems in a validated realistic environment. This test supports design refinements of capabilities related to the use of nitrous oxide for non-vitiated hot air flow used in HS/H engine testing. The Hot Air Tunnel validates safety and chemistry requirements for HS/H systems in a validated realistic environment. The effort will began development of a full duration test laboratory capability for HS/H systems.			
<b>Congressional Add:</b> Program increase - conventional mission capabilities		-	10.250
<b>FY 2021 Plans:</b> FY21 Conventional Mission Capabilities: The Space and Missile Defense Technical Center (SMDTC) matured rapid mission planning and range safety capabilities leveraging existing, proven, and low-risk systems. These efforts integrates and develops software tools for trajectory propagation, aerothermal analysis, flight guidance, system vulnerability, and real-time weather. The effort supports test in the Air and Missile Software Integration Laboratory (AMSIL) to meet the near and long-term advances in Integrated Air and Missile Defense (IAMD) system requirements including the Long Range Hypersonic Weapon (LRHW). The SMDTC continues the development of a mission planner supporting detailed flight planning of emerging weapon systems including the LRHW. This planner combines high fidelity vehicle flight dynamics, aerothermal analyses, signature analyses, and environmental analyses (including real-time and predicted weather) with a comprehensive human/machine interface (HMI) and visualization capability. The SMDTC augmented the planner compliant tools enabling hazard analysis. Initiated adding capabilities for link margin analyses for telemetry, radar, and flight termination systems. Initiated integration of capability within the AMSIL.			
<b>Congressional Add:</b> Program increase - air and missile system critical technology development		-	12.000
<b>FY 2021 Plans:</b> FY21 Air and Missile System Critical Technology Development (AMSCT): The Space and Missile Defense Technical Center (SMDTC) continue the development and demonstration of scalable HPM devices that can be integrated on multiple platforms. The effort assess HPM lethality to optimized effects in threat systems and Identifies HPM protection capabilities to battlefield systems. Provides and develops Air and Missile test environment supporting multiple Space and IAMD technologies and weapon systems.			
<b>Congressional Add:</b> Program increase - advanced technology end-to-end testbed		-	10.500

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army		<b>Date:</b> May 2021	
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603305A / Army Missile Defense Systems Integration	<b>Project (Number/Name)</b> TR5 / Missile Defense Battlelab	
		<b>FY 2020</b>	<b>FY 2021</b>
<b>FY 2021 Plans:</b> FY21 Advanced Technology end-to-end testbed: The Space and Missile Defense Technical Center (SMDTC) initiates the establishment an Advanced Technology Testbed simulation and test capability to replicate realistic flight in 3 and 6 Degrees of Freedom (DOF) dynamic environments for advanced weapon systems. The capability supported the assessment of effect of these environments on critical subsystems, including the state-of-the-art Integrated Air and Missile Defense (IAMD) seekers/sensors, avionics guidance computers, and inertial measurement units (IMU). The testbed will be designed and developed to include offensive and defensive weapon technologies to engage the emerging threats in a realistic environment, for complete kill chain of air and missile defense technology evaluation capability. Initiate technical simulations of advanced IAMD threat sand capabilities to assess system task plans, and engagement plans (e.g. 3DOF, 6DOF) with possible use for ground tests			
<b>Congressional Add:</b> Program increase - gun launched interceptors		-	8.000
<b>FY 2021 Plans:</b> Research and develop how Counter - Rocket, Artillery, Mortar / Unmanned Aerial Systems (C-RAM / C-UAS) defenses can be overwhelmed by swarm attack . This work will prototype a maneuverable, laser guided GLI by utilizing an Insensitive Munitions compliant solid propulsion divert system and a laser seeker assembly. Design, integrate, and test a prototype GLI to address the C-RAM / C-UAS mission as part of the Integrated Air and Missile Defense role.			
<b>Congressional Add:</b> Program increase		-	15.000
<b>FY 2021 Plans:</b> Develop techniques for protection of tactical space resources against cyberattack and dedicated capabilities for continual responsiveness to threat advancement Develop and integrate advanced capability prototype Hardware in The Loop (HWIL) / Software in the Loop (SWIL) for cyber resilient tactical space technologies. Perform non-invasive multi-source attack vector stimulation of space prototypes to support the development and integration of future Army space capabilities that are globally responsive to the joint warfighter and provide the foundation for long-term overmatch against near-peer adversaries. Develop and fabricate thermal management system test and integrations evaluation capability. Develop Electronics cooling for supersonic and hypersonic missiles scalable directly with missile components. Complex compound heat shield materials development and test he joint warfighter and provide the foundation for long-term overmatch against near-peer adversaries. Research and Enhance Laser Lethality Infrastructure for Cruise Missile Lethality Vulnerability Modules developments. Research and Purchase targets for Lethality Vulnerability Module developments.			
<b>Congressional Adds Subtotals</b>		48.500	129.250

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603305A / Army Missile Defense Systems Integration	Project (Number/Name) TR5 / Missile Defense Battlelab
<b>C. Other Program Funding Summary (\$ in Millions)</b> N/A		
<b>Remarks</b>		
<b>D. Acquisition Strategy</b> N/A		

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army** **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603305A / Army Missile Defense Systems Integration	<b>Project (Number/Name)</b> TR5 / Missile Defense Battlelab
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<b>Management Services (\$ in Millions)</b>				<b>FY 2020</b>		<b>FY 2021</b>		<b>FY 2022 Base</b>		<b>FY 2022 OCO</b>		<b>FY 2022 Total</b>			
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
Government Personnel and Operations Support	C/TBD	To Be determined : To be Determined	9.364	7.213		7.307		7.797		-		7.797	Continuing	Continuing	-
<b>Subtotal</b>			9.364	7.213		7.307		7.797		-		7.797	Continuing	Continuing	N/A

<b>Product Development (\$ in Millions)</b>				<b>FY 2020</b>		<b>FY 2021</b>		<b>FY 2022 Base</b>		<b>FY 2022 OCO</b>		<b>FY 2022 Total</b>			
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
Contracts	Various	To Be Determined : To Be determined	2.393	3.667		3.638		3.905		-		3.905	Continuing	Continuing	-
Various	Various	To be determined : to be determined	-	48.438		129.250		-		-		-	0.000	177.688	-
<b>Subtotal</b>			2.393	52.105		132.888		3.905		-		3.905	Continuing	Continuing	N/A

<b>Support (\$ in Millions)</b>				<b>FY 2020</b>		<b>FY 2021</b>		<b>FY 2022 Base</b>		<b>FY 2022 OCO</b>		<b>FY 2022 Total</b>			
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
Experiments & technology enhancements of prototypes/tools and analysis.	Various	Various Colorado Springs CO and Huntsville AL : Alabama, Colorado Springs	117.427	-		-		-		-		-	Continuing	Continuing	Continuing
Govt Support and Support Contracts	Various	Various Colorado Springs CO and Huntsville AL : Alabama, Colorado Springs	138.783	-		-		-		-		-	Continuing	Continuing	Continuing
<b>Subtotal</b>			256.210	-		-		-		-		-	Continuing	Continuing	N/A

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<b>Exhibit R-3, RDT&amp;E Project Cost Analysis: PB 2022 Army</b>								<b>Date: May 2021</b>			
<b>Appropriation/Budget Activity</b> 2040 / 4				<b>R-1 Program Element (Number/Name)</b> PE 0603305A / <i>Army Missile Defense Systems Integration</i>				<b>Project (Number/Name)</b> TR5 / <i>Missile Defense Battlelab</i>			
	<b>Prior Years</b>	<b>FY 2020</b>		<b>FY 2021</b>		<b>FY 2022 Base</b>	<b>FY 2022 OCO</b>	<b>FY 2022 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Project Cost Totals</b>	267.967	59.318		140.195		11.702	-	11.702	Continuing	Continuing	N/A

**Remarks**

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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2022 Army</b>		<b>Date: May 2021</b>
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603305A / Army Missile Defense Systems Integration	<b>Project (Number/Name)</b> TR5 / Missile Defense Battlelab

Event Name	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Experiments & technology enhancements of prototypes																												
Development of Extended Air Defense Simulation Updates																												
Reconfigurable Tactical Operations System (RTOS) Development																												
JFCC-Integrated Missile Defense Operational Analysis																												
Analysis Support to JIAMD																												
AN/TPY-2 FBM Program Management																												
Missile Defense Simulation Suppt to TRADOC ARCIC Experiments																												
Force Design Requirements Assessment for Missile Defense Force																												

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<b>Exhibit R-4A, RDT&amp;E Schedule Details: PB 2022 Army</b>		<b>Date: May 2021</b>
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603305A / <i>Army Missile Defense Systems Integration</i>	<b>Project (Number/Name)</b> TR5 / <i>Missile Defense Battlelab</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Experiments & technology enhancements of prototypes	1	2018	4	2027
Development of Extended Air Defense Simulation Updates	1	2018	4	2027
Reconfigurable Tactical Operations System (RTOS) Development	1	2018	4	2027
JFCC-Integrated Missile Defense Operational Analysis	1	2018	4	2027
High Energy Laser for AMD	1	2015	4	2018
Analysis Support to JIAMDO	1	2018	4	2027
AN/TPY-2 FBM Program Management	1	2018	4	2027
Missile Defense Simulation Suppt to TRADOC ARCIC Experimentation	1	2018	4	2027
Force Design Requirements Assessment for Missile Defense Forces	1	2018	4	2027
Allied and Partner Modeling to Inform Integration Efforts to Meet Objectives	3	2016	4	2018
Pacific Focused-Adversary Centric Bundled	3	2016	4	2018
Inert Debris Analysis	3	2017	2	2018
Hypersonics Analysis	2	2017	4	2018



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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2022 Army **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040: <i>Research, Development, Test &amp; Evaluation, Army / BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0603308A / <i>Army Space Systems Integration</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	-	-	25.584	18.755	-	18.755	-	-	-	-	-	-
990: <i>Space And Missile Defense Integration</i>	-	-	25.584	18.755	-	18.755	-	-	-	-	-	-

**A. Mission Description and Budget Item Justification**

All Project FE5 funding is being transfer to Project 990 funding in FY2021

USASMD/ARSTRAT: Headquarters, Department of the Army General Order 37, dated 16 October 2006, designated USASMD/ARSTRAT as the Army proponent for space, the Army integrator for global missile defense (GMD), and the Army Service Component Command (ASCC) of the USSTRATCOM. Army Regulation (AR) 10-87, Army Commands, Army Service Component Commands, and Direct Reporting Units, dated 4 September 2007, and AR 5-22, The Army Force Modernization Proponent System, dated 19 August 2009, designated USASMD/ARSTRAT as the Army specified proponent for Space/High Altitude capabilities. As the Army proponent for space and high altitude, USASMD/ARSTRAT is responsible for developing warfighting concepts, conduct warfighting experiments to validate those concepts, identify capabilities needed to implement the validated concepts, and develop Doctrine, Organizations, Training, Material, Leadership & Education, Personnel, Facilities and Policy (DOTMLPF-P) solutions.

The Friendly Force Data Integration and Management (FFDIM) Capability Definition Package (CDP), a Joint Capabilities Integration and Development System (JCIDS) requirements document (October 2017) validated the Joint Friendly Force Tracking (JFFT) Testbed's development, testing and integration capabilities and Friendly Force Tracking (FFT) System Expert support provided by U.S. Army Space and Missile Defense Command (USASMD) as U.S. Strategic Command's (USSTRATCOM's) Army Service Component Command (ASCC). In addition, Chairman of the Joint Chiefs of Staff Instruction 3910 (FFT Operations Guidance) directs USSTRATCOM's ASCC to execute eight specified FFT mission support responsibilities that include providing a testing and development capability to support joint, interagency and coalition partners FFT operations. USASMD/ARSTRAT: Headquarters, Department of the Army General Order 37, dated 16 October 2006, designated USASMD/ARSTRAT as the Army proponent for space, the Army integrator for global missile defense (GMD), and the Army Service Component Command (ASCC) of the USSTRATCOM. Army Regulation (AR) 10-87, Army Commands, Army Service Component Commands, and Direct Reporting Units, dated 4 September 2007, and AR 5-22, The Army Force Modernization Proponent System, dated 19 August 2009, designated USASMD/ARSTRAT as the Army specified proponent for Space/High Altitude capabilities. As the Army proponent for space and high altitude, USASMD/ARSTRAT is responsible for developing warfighting concepts, conduct warfighting experiments to validate those concepts, identify capabilities needed to implement the validated concepts, and develop Doctrine, Organizations, Training, Material, Leadership & Education, Personnel, Facilities and Policy (DOTMLPF-P) solutions.

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2022 Army	<b>Date:</b> May 2021
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<b>Appropriation/Budget Activity</b> 2040: <i>Research, Development, Test &amp; Evaluation, Army / BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0603308A / <i>Army Space Systems Integration</i>
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<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022 Base</b>	<b>FY 2022 OCO</b>	<b>FY 2022 Total</b>
Previous President's Budget	0.000	26.230	18.775	-	18.775
Current President's Budget	0.000	25.584	18.755	-	18.755
Total Adjustments	0.000	-0.646	-0.020	-	-0.020
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-0.646			
• Adjustments to Budget Years	-	-	-0.020	-	-0.020

**Change Summary Explanation**

Additional funding for PNT NAVWAR effort

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army										<b>Date:</b> May 2021		
<b>Appropriation/Budget Activity</b> 2040 / 4					<b>R-1 Program Element (Number/Name)</b> PE 0603308A / Army Space Systems Integration				<b>Project (Number/Name)</b> 990 / Space And Missile Defense Integration			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022 Base</b>	<b>FY 2022 OCO</b>	<b>FY 2022 Total</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>FY 2026</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
990: Space And Missile Defense Integration	-	-	25.584	18.755	-	18.755	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

USASMDC: Headquarters, Department of the Army General Order 37, dated 16 October 2006, designated USASMDC as the Army proponent for space, the Army integrator for global missile defense (GMD), and the Army Service Component Command (ASCC) of the USSTRATCOM. Army Regulation (AR) 10-87, Army Commands, Army Service Component Commands, and Direct Reporting Units, dated 4 September 2007, and AR 5-22, The Army Force Modernization Proponent System, dated 19 August 2009, designated USASMDC as the Army specified proponent for Space/High Altitude capabilities. As the Army proponent for space and high altitude, USASMDC is responsible for developing warfighting concepts, conduct warfighting experiments to validate those concepts, identify capabilities needed to implement the validated concepts, and develop Doctrine, Organizations, Training, Material, Leadership & Education, Personnel, Facilities and Policy (DOTMLPF-P) solutions.

The Friendly Force Data Integration and Management (FFDIM) Capability Definition Package (CDP), a Joint Capabilities Integration and Development System (JCIDS) requirements document (October 2017) validated the Joint Friendly Force Tracking (JFFT) Testbed's development, testing and integration capabilities and Friendly Force Tracking (FFT) System Expert support provided by U.S. Army Space and Missile Defense Command (USASMDC) as U.S. Strategic Command's (USSTRATCOM's) Army Service Component Command (ASCC). In addition, Chairman of the Joint Chiefs of Staff Instruction 3910 (FFT Operations Guidance) directs USSTRATCOM's ASCC to execute eight specified FFT mission support responsibilities that include providing a testing and development capability to support joint, interagency and coalition partners FFT operations. USASMDC: Headquarters, Department of the Army General Order 37, dated 16 October 2006, designated USASMDC as the Army proponent for space, the Army integrator for global missile defense (GMD), and the Army Service Component Command (ASCC) of the USSTRATCOM. Army Regulation (AR) 10-87, Army Commands, Army Service Component Commands, and Direct Reporting Units, dated 4 September 2007, and AR 5-22, The Army Force Modernization Proponent System, dated 19 August 2009, designated USASMDC as the Army specified proponent for Space/High Altitude capabilities. As the Army proponent for space and high altitude, USASMDC is responsible for developing warfighting concepts, conduct warfighting experiments to validate those concepts, identify capabilities needed to implement the validated concepts, and develop Doctrine, Organizations, Training, Material, Leadership & Education, Personnel, Facilities and Policy (DOTMLPF-P) solutions.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
<b>Title:</b> Architecture Development, War games and Demonstrations	-	11.651	10.533
<b>Description:</b> All Project FE5 funding is being transfer to Project 990 funding in FY 2021.			
Funding is provided for planning, developing, and executing architectures and combat development solutions for Army integration of space systems, space control capabilities, missile defense, and high altitude systems.			

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603308A / Army Space Systems Integration	<b>Project (Number/Name)</b> 990 / Space And Missile Defense Integration

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
<p><b>FY 2021 Plans:</b> USASMDC Space and Missile Defense Center of Excellence (SMDCOE) will continue the full spectrum of JCIDS concept to capability development efforts to enhance the resiliency and effectiveness of critical space-based and space enabled assets and JCIDS capability development activities for space superiority, theater missile warning, high altitude, and emerging concepts/ technology for the full range of Navigation Warfare, tactical space layer, hypersonics, counter hypersonics, and directed energy. SMDCoE will participate in robust campaign of learning with the Army, Army Futures Command, Joint and sister service wargaming, experimentation, live prototyping, studies, assessments, and exercises to learn, validate, develop, and integrate the concepts and technology described above. SMDCOE will provide support to PEO IEWS and PEO M&amp;S to acquire and field space superiority and enhanced missile warning capabilities. A JTAGS Block III CDD will be written to document the requirements to meet advanced missile threats and to counter hypersonics. A high altitude CDD will be written to capture the requirements for a high altitude, multi-mission, persistent platform to provide resiliency for space based capabilities. A Theater Space Warfare Operational and Organizational Concept and Army Space concept will capture the observations and insights from the campaign of learning and drive required capability development consistent with the Army's Operating Concept of Multi-Domain Operations (MDO) and CSA and Army Modernization Enterprise guidance for MDO capable forces by 2028 and MDO ready forces by 2035. CAPDEV, across the DOTMLPF-P, support will be provided to the APNT CFT to document the enduring requirements for the tactical space layer and NAVWAR capabilities for situational awareness, assured PNT and PNT denial to our adversaries.</p> <p><b>FY 2022 Plans:</b> USASMDC Space and Missile Defense Center of Excellence (SMDCoE) will continue the full spectrum of JCIDS concept to capability development efforts to enhance the resiliency and effectiveness of critical space-based and space enabled assets and JCIDS capability development activities for space superiority, theater missile warning, high altitude, and emerging concepts/ technology for the full range of Navigation Warfare, tactical space layer, hypersonics, counter hypersonics, and directed energy. SMDCoE will participate in robust campaign of learning with the Army, Army Futures Command, Joint and sister service wargaming, experimentation, live prototyping, studies, assessments, and exercises to learn, validate, develop, and integrate the concepts and technology described above. SMDCoE will provide support to PEO IEWS and PEO M&amp;S to acquire and field space superiority and enhanced missile warning capabilities. USASMDC Space and Missile Defense Center of Excellence (SMDCoE) will execute these funds in FY 2022.</p> <p><b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> Decrease to the Architecture Development, War games and Demonstrations program.</p>			
<p><b>Title:</b> Joint Friendly Force Tracking (J-FFT) Testbed</p> <p><b>Description:</b> All Project FE5 funding is being transfer to Project 990 funding in FY 2021.</p>	-	3.170	3.498

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603308A / Army Space Systems Integration	<b>Project (Number/Name)</b> 990 / Space And Missile Defense Integration

**B. Accomplishments/Planned Programs (\$ in Millions)**

	FY 2020	FY 2021	FY 2022
<p>Joint-Friendly Force Tracking (J-FFT) division provides capabilities development, sustainment, and technical support to the Friendly Force Tracking (FFT) and Hostile Force Tagging, Tracking, and Locating (HF TTL) efforts of Combatant Commanders, Services, U.S. Government Agencies, Allies, and Coalition partners to support situational awareness (SA), command and control (C2), interoperability, fratricide prevention, and lethality projection. J-FFT develops solutions at all classification levels to integrate FFT, HF TTL and other Position Location Information (PLI) and C2 data into current and planned architectures, systems, and operational pictures, and support development and deployment of requirements to satisfy rapidly evolving Joint C2 requirements. Major customers: SMDC Force Tracking Mission Management Center (FT MMC); Special Operations Command (SOCOM); Africa Command (AFRICOM); Air Force Rapid Capabilities Office (AF RCO); Joint Staff J6. J-FFT enables the FT MMC to support: 59 device types; 22 data architectures; 518 user groups; over 146K registered devices; over 5M FFT reports/day; over 400 distress messages ("911") alert reports/year. USSTRATCOM, in accordance with CJCSI 3910.01 (reference V.4.) is designated one of three coordinating agencies for J-FFT within DoD. CJCSI 3910.01 directs eight Force Modernization tasks to USSTRATCOM. USSTRATCOM SI 534-5 (reference V.6.) and annually published USSTRATCOM operations orders have designated USASMDC as the lead USSTRATCOM component command for Friendly Force Tracking (FFT).</p> <p><b>FY 2021 Plans:</b> J-FFT Testbed supports SMDC Force Tracking Mission Management Center (FT MMC) Special Operations Command (SOCOM) Africa Command (AFRICOM) Air Force Rapid Capabilities Office (AF RCO) Joint Staff J6 and other U.S. Government agencies by providing agile capability development and integrated solutions to validated requirements that enable interoperable force tracking data exchange and satisfy joint, agency and coalition warfighting needs for timely, accurate Common Operational Picture (COP) displays and decision making. JFFT development will continue to respond to the growth in FFT device use by enabling the number of device types, data types, and displays supported by the various FFT and HF TTL data architectures. The JFFT Testbed is scheduled to develop and deliver new capabilities including command and control messaging, new FFT and HF TTL data sources and devices, and the ratified NATO message standard for FFT. Also planned is the inclusion of cloud data services at the Impact Level 2 (IL 2) (publicly releasable data), IL 5 (unclassified; national security data), and IL 6 (secret), and re-design and implementation of needed upgrades to the Force Tracking Web product, fulfilling requirements for added functionality in data visualization and management. JFFT will continue to exploit, expand and provide mission owners with approved infrastructures at all classification levels that achieve improved performance and reduce costs. JFFT Testbed will remain a key contributor to support North Atlantic Treaty Organization Capability Team activities and other coalition assessments and exercises that advance US and coalition FFT interoperability. USASMDC Space and Missile Defense Center of Excellence (SMDCOE) will execute these funds in FY 2021.</p> <p><b>FY 2022 Plans:</b> J-FFT Testbed supports SMDC Force Tracking Mission Management Center (FT MMC) Special Operations Command (SOCOM) Africa Command (AFRICOM) Air Force Rapid Capabilities Office (AF RCO) Joint Staff J6 and other U.S. Government agencies</p>			

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603308A / Army Space Systems Integration	<b>Project (Number/Name)</b> 990 / Space And Missile Defense Integration

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
<p>by providing agile capability development and integrated solutions to validated requirements that enable interoperable force tracking data exchange and satisfy joint, agency and coalition warfighting needs for timely, accurate Common Operational Picture (COP) displays and decision making. JFFT development will continue to respond to the growth in FFT device use by enabling the number of device types, data types, and displays supported by the various FFT and HF TTL data architectures. The JFFT Testbed is scheduled to develop and deliver new capabilities for added functionality in data visualization and management. JFFT will continue to exploit, expand and provide mission owners with approved infrastructures at all classification levels that achieve improved performance and reduce costs. JFFT Testbed will remain a key contributor to support North Atlantic Treaty Organization Capability Team activities and other coalition assessments and exercises that advance US and coalition FFT interoperability. USASMDC Space and Missile Defense Center of Excellence (SMDCoE) will execute these funds in FY 2022.</p> <p><b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> The projected \$275K (8.5%) increase to the J-FFT program in FY2022 is essential to advancing the capability of the program to ensure continued protection from fratricide to the warfighter and improved hostile force tracking.</p>			
<p><b>Title:</b> Organizational Development as Part of the SRC40 Proponecy Mission</p> <p><b>Description:</b> All Project FE5 funding is being transfer to Project 990 funding in FY 2021.</p> <p>Continue participation in the Force Design Update (FDU) process. Development of Operational &amp; Organizational (O&amp;O) Concept Papers, Organization Design Papers, Cost Benefit Analyses, Unit Reference Sheets (URS), and Manpower Requirements Criteria (MARC) determination.</p> <p><b>FY 2021 Plans:</b> Continue to participate in the Force Design Update (FDU) process. The U.S. Army Space and Missile Defense Command (USASMDC) Space and Missile Defense Center of Excellence (SMDCoE) will participate in the recurring process used to gain HQDA approval of organizational structure changes and designs through the FDU and FDU Jr. processes. This includes the development of Operational &amp; Organizational Concept Papers, Organization Design Papers, Cost Benefit Analyses, Unit Reference Sheets, and Manpower Requirements Criteria determination. Participate in the Total Army Analysis (TAA), the Army's annual process to examine the projected Army force qualitatively and quantitatively. USASMDC will support TAA Rule of Allocation development, Capability Demand Analysis and Resourcing phases to ensure SRC40 units are properly accounted for in the future Program Objectives Memorandum (POM) Force. This is performed to analyze the projected Army Force against future demands and levels of funding/authorizations to build the POM Force. USASMDC SMDCOE will review the USASMDC Troops, Organization and Equipment (TOE) requirements documents conducted as part of a cyclic process as well when needed during other Force Design processes (i.e.-Basis of Issue Plan (BOIP) Modernization Path (MODPATH) reviews, Notification of Change reviews, SSN-LIN Automated Management and Integrating System (SLAMIS) reviews, etc.). Participate in BOIP Development. BOIP Development is collection of processes including the cyclic review of Army-wide BOIPs under development, development of</p>	-	2.853	2.567

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603308A / Army Space Systems Integration	<b>Project (Number/Name)</b> 990 / Space And Missile Defense Integration

**B. Accomplishments/Planned Programs (\$ in Millions)**

	FY 2020	FY 2021	FY 2022
<p>Feeder Data for USASMDC proponent item BOIPs, and validation of BOIP MODPATHs to USASMDC TOEs. Complete the Space Forces Force Structure Review which is a Cost-Benefit Analysis-like structured three-phased process consisting of a Needs Analysis, Gap Analysis, and Solutions Analysis to identify and document organizational based capability needs and gaps, develop a prioritized list of those gaps, and identify potential materiel and/or non-materiel solutions.</p> <p>U.S. Army Space and Missile Defense Command (USASMDC) Space and Missile Defense Center of Excellence (SMDCoE) will execute these funds in FY 2021.</p> <p><b>FY 2022 Plans:</b> Continue to participate in the Force Design Update (FDU) process. The U.S. Army Space and Missile Defense Command (USASMDC) Space and Missile Defense Center of Excellence (SMDCoE) will participate in the recurring process used to gain HQDA approval of organizational structure changes and designs through the FDU and FDU Jr. processes. This includes the development of Operational &amp; Organizational Concept Papers, Organization Design Papers, Cost Benefit Analyses, Unit Reference Sheets, and Manpower Requirements Criteria determination. Participate in the Total Army Analysis (TAA), the Army's annual process to examine the projected Army force qualitatively and quantitatively. USASMDC will support TAA Rule of Allocation development, Capability Demand Analysis and Resourcing phases to ensure SRC40 units are properly accounted for in the future Program Objectives Memorandum (POM) Force. This is performed to analyze the projected Army Force against future demands and levels of funding/authorizations to build the POM Force. USASMDC SMDCoE will review the USASMDC Troops, Organization and Equipment (TOE) requirements documents conducted as part of a cyclic process as well when needed during other Force Design processes (i.e.-Basis of Issue Plan (BOIP) Modernization Path (MODPATH) reviews, Notification of Change reviews, SSN-LIN Automated Management and Integrating System (SLAMIS) reviews, etc.). Participate in BOIP Development. BOIP Development is collection of processes including the cyclic review of Army-wide BOIPs under development, development of Feeder Data for USASMDC proponent item BOIPs, and validation of BOIP MODPATHs to USASMDC TOEs. Complete the Space Forces Force Structure Review which is a Cost-Benefit Analysis-like structured three-phased process consisting of a Needs Analysis, Gap Analysis, and Solutions Analysis to identify and document organizational based capability needs and gaps, develop a prioritized list of those gaps, and identify potential materiel and/or non-materiel solutions.</p> <p>U.S. Army Space and Missile Defense Command (USASMDC) Space and Missile Defense Center of Excellence (SMDCoE) will execute these funds in FY 2022.</p> <p><b>FY 2021 to FY 2022 Increase/Decrease Statement:</b></p>			

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603308A / Army Space Systems Integration	<b>Project (Number/Name)</b> 990 / Space And Missile Defense Integration

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
Overall funding reductions to the Army Space Systems Integration (990) program result in a 12% decrease to the SRC40 Proponency Mission will limit USSMDC's ability to gain approval of organizational structure changes and designs for Army space forces in FY2022.			
<p><b>Title:</b> Position, Navigation, and Timing Navigation Warfare (PNT/NAVWAR)</p> <p><b>Description:</b> USASMDC Space and Missile Defense Center of Excellence (SMDCoE) will continue JCIDS capability development efforts to enhance the resiliency and effectiveness of critical space-based and space enabled assets and JCIDS capability development activities for space superiority, theater missile warning, high altitude, and emerging concepts/ technology for the full range of Navigation Warfare, tactical space layer, hypersonics, counter hypersonics, and directed energy. SMDCoE will provide support to PEO IEWS and PEO M&amp;S to acquire and field space superiority and enhanced missile warning capabilities. A JTAGS Block III CDD will be written to document the requirements to meet advanced missile threats and to counter hypersonics. A high altitude CDD will be written to capture the requirements for a high altitude, multi-mission, persistent platform to provide resiliency for space based capabilities. CAPDEV support will be provided to the APNT CFT to document the enduring requirements for the tactical space layer and NAVWAR capabilities for situational awareness, assured PNT and PNT denial to our adversaries.</p> <p>U.S. Army Space and Missile Defense Command (USASMDC) Space and Missile Defense Center of Excellence (SMDCoE) will execute these funds.</p> <p><b>FY 2021 Plans:</b> Based on the results of our efforts in 2020 the USASMDC Space and Missile Defense Center of Excellence will continue to identify and advocate for PNT and NAVWAR emerging requirements through Commander, U.S. Strategic Command to the joint staff to establish and formalize joint NAVWAR requirements, in the JCIDS process. Support the Army Assured Positioning Navigation and Timing (APNT) Cross Functional Team by conducting required capability analysis and developing JCIDS documents for APNT Enabling systems and APNT Situational Awareness. Specific actions planned are</p> <ul style="list-style-type: none"> <li>? Write Alternate Navigation Concept of Operations</li> <li>? Support planning and execution of Lonestar Development Operations</li> <li>? Support planning and execution of Alternate Navigation Development Operations</li> <li>? Write and coordinate Gunsmoke requirements document</li> <li>? Write and coordinate Lonestar requirements document</li> <li>? Document Alternate Navigation requirements</li> <li>? Obtain input from the NAVWAR Community of Interest and write NAVWAR Attack CONOPS</li> <li>? Support execution of NAVWAR Attack Study</li> </ul>	-	3.033	2.157



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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603308A / <i>Army Space Systems Integration</i>	<b>Project (Number/Name)</b> 990 / <i>Space And Missile Defense Integration</i>

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
<p>? Facilitate inclusion of NAVWAR Attack systems in Army experiment, exercises, war games and other events to build knowledge about the Army need for this capability</p> <p>? Write and coordinate NAVWAR Attack requirements document</p> <p>? Identify how NAVWAR Attack concepts and capabilities will Multi-Domain operations</p> <p>? Provide NAVWAR and space subject matter expertise to help develop Fires Organizational and Operational Concept Document</p> <p>? Furnish NAVWAR subject matter expertise to support revision of Space Brigade Organizational and Operational Concept Division</p> <p>? Conduct analysis to determine if the fielding of a candidate NAVWAR technology would drive organizational changes</p> <p><b><i>FY 2022 Plans:</i></b></p> <p>Based on the results of our efforts in 2021 the USASMDC Space and Missile Defense Center of Excellence will continue to identify and advocate for PNT and NAVWAR emerging requirements through Commander, U.S. Strategic Command to the joint staff to establish and formalize joint NAVWAR requirements, in the JCIDS process. Support the Army Assured Positioning Navigation and Timing (APNT) Cross Functional Team by conducting required capability analysis and developing JCIDS documents for APNT Enabling systems and APNT Situational Awareness. Specific actions planned are</p> <ul style="list-style-type: none"> <li>* Write Alternate Navigation Concept of Operations</li> <li>* Support planning and execution of Lonestar Development Operations</li> <li>* Support planning and execution of Alternate Navigation Development Operations</li> <li>* Write and coordinate Gunsmoke requirements document</li> <li>* Write and coordinate Lonestar requirements document</li> <li>* Document Alternate Navigation requirements</li> <li>* Obtain input from the NAVWAR Community of Interest and write NAVWAR Attack CONOPS</li> <li>* Support execution of NAVWAR Attack Study</li> <li>* Facilitate inclusion of NAVWAR Attack systems in Army experiment, exercises, war games and other events to build knowledge about the Army need for this capability</li> <li>* Write and coordinate NAVWAR Attack requirements document</li> <li>* Identify how NAVWAR Attack concepts and capabilities will Multi-Domain operations</li> <li>* Provide NAVWAR and space subject matter expertise to help develop Fires Organizational and Operational Concept Document</li> <li>* Furnish NAVWAR subject matter expertise to support revision of Space Brigade Organizational and Operational Concept Division</li> <li>* Conduct analysis to determine if the fielding of a candidate NAVWAR technology would drive organizational changes</li> </ul>			

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army		<b>Date:</b> May 2021		
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603308A / Army Space Systems Integration	<b>Project (Number/Name)</b> 990 / Space And Missile Defense Integration		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
U.S. Army Space and Missile Defense Command (USASMDC) Space and Missile Defense Center of Excellence (SMDCoE) will execute these funds in FY 2022.				
<b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> USSMDC received a one year increase in FY2021 to support increased manpower for this requirement but has not yet been able to get the required positions authorized and funded for FY22 and beyond.				
<b>Title:</b> APNT Integrated Space Communications		-	4.877	-
<b>Description:</b> Development of a unique advanced space communications capability to explore advanced ground based space communications technologies and concepts utilizing bi-static Radio Frequency (RF) scattering and propagation with precision frequency, phase, and power management. This space communications capability will develop and demonstrate multiple advanced Army LEO space communications concepts and will also assess interfacing with multiple Joint Service space communication missions.				
The APNT CFT will execute \$4.8770M of these funds in FY 2021.				
<b>FY 2021 Plans:</b> Assess performance of space communications capabilities of multiple advanced Army LEO space communications concepts and interfacing with multiple Joint Services.				
<b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> Decrease in FY22 is due to transition of Integrated Space Communications to APNT CFT.				
<b>Accomplishments/Planned Programs Subtotals</b>		-	25.584	18.755
<b>C. Other Program Funding Summary (\$ in Millions)</b>				
N/A				
<b>Remarks</b>				
<b>D. Acquisition Strategy</b>				
N/A				

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army** **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603308A / Army Space Systems Integration	<b>Project (Number/Name)</b> 990 / Space And Missile Defense Integration
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<b>Management Services (\$ in Millions)</b>				<b>FY 2020</b>		<b>FY 2021</b>		<b>FY 2022 Base</b>		<b>FY 2022 OCO</b>		<b>FY 2022 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>			
Government Personnel and Operations support	TBD	SMDC/ARSTRAT Huntsville, AL and Colorado Springs; SMDC/ARSTRAT Huntsville, AL and Colorado Spring : Huntsville, AL and Colorado Spring, CO	-	-		20.707		18.755		-		18.755	Continuing	Continuing	-
<b>Subtotal</b>			-	-		20.707		18.755		-		18.755	Continuing	Continuing	N/A

<b>Product Development (\$ in Millions)</b>				<b>FY 2020</b>		<b>FY 2021</b>		<b>FY 2022 Base</b>		<b>FY 2022 OCO</b>		<b>FY 2022 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>			
APNT Integrated Space Communications0	TBD	Various : Huntsville AL, Wilmington, MA, Boulder CO, VA	-	-		4.877		-		-		-	0.000	4.877	-
<b>Subtotal</b>			-	-		4.877		-		-		-	0.000	4.877	N/A

<b>Project Cost Totals</b>	<b>Prior Years</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022 Base</b>	<b>FY 2022 OCO</b>	<b>FY 2022 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
	-	-	25.584	18.755	-	18.755	Continuing	Continuing	N/A

**Remarks**

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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2022 Army</b>		<b>Date: May 2021</b>
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603308A / Army Space Systems Integration	<b>Project (Number/Name)</b> 990 / Space And Missile Defense Integration

Event Name	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026																																															
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4																																												
Space Superiority Capability Development																																																																								
Counter ISR Capability Development																																																																								
Space Operations Multit-Domain Environment Analysis																																																																								
ICEWS Study																																																																								
High Altitude Impacts on Ground Effectiveness Study																																																																								
NAVWAR Characterization Study																																																																								
APNT CFT Analysis Support																																																																								
Joint Space Warfighting Forum (JSWF) Analysis Support																																																																								
Support of the APN/CFT																																																																								
Low Earth Orbit																																																																								
Development of SMDC MMN Force Tracking																																																																								
Jericho Thunder Analysis Support																																																																								
SMDC NanSat Analysis (SNAP, KE)																																																																								

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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2022 Army</b>		<b>Date: May 2021</b>
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603308A / Army Space Systems Integration	<b>Project (Number/Name)</b> 990 / Space And Missile Defense Integration

Event Name	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Space Superiority Joint Architecture Analysis																												
Force Design Assessment of Army Forces																												
NAVWAR/PNT Gap Analysis and Advocacy																												
Space Simulation Support to TRADOC ARCIC Experimentation																												
NAVWAR Defense/Attack Operating Concepts and Requirement																												
Army Enduring JFFT Development																												
High Altitude Persistent Platform Capability Development Documentation																												
APNT Integrated Space Communications																												

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<b>Exhibit R-4A, RDT&amp;E Schedule Details: PB 2022 Army</b>		<b>Date: May 2021</b>
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603308A / Army Space Systems Integration	<b>Project (Number/Name)</b> 990 / Space And Missile Defense Integration

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Space Superiority Capability Development	1	2021	4	2023
Counter ISR Capability Development	1	2021	4	2023
Space Operations Mult-Domain Environment Analysis	1	2021	4	2023
ICEWS Study	1	2021	1	2021
High Altitude Impacts on Ground Effectiveness Study	1	2021	1	2021
NAVWAR Characterization Study	1	2021	1	2021
APNT CFT Analysis Support	1	2021	4	2024
Joint Space Warfighting Forum (JSWF) Analysis Support	1	2021	4	2024
Support of the APN/CFT	1	2021	4	2024
Low Earth Orbit	1	2021	4	2025
Development of SMDC MMN Force Tracking	1	2021	4	2023
Jericho Thunder Analysis Support	1	2021	4	2024
SMDC NanSat Analysis (SNAP, KE)	1	2021	4	2024
Space Superiority Joint Architecture Analysis	1	2021	4	2023
Force Design Assessment of Army Forces	1	2021	4	2022
NAVWAR/PNT Gap Analysis and Advocacy	1	2021	4	2024
Space Simulation Support to TRADOC ARCIC Experimentation	1	2021	4	2023
NAVWAR Defense/Attack Operating Concepts and Requirement	1	2021	4	2023
Army Enduring JFFT Development	1	2021	4	2023
High Altitude Persistent Platform Capability Development Documentation	1	2021	4	2023
APNT Integrated Space Communications	1	2021	4	2022

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2022 Army **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040: <i>Research, Development, Test &amp; Evaluation, Army / BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0603327A / <i>Air and Missile Defense Systems Engineering</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	-	52.672	47.098	-	-	-	-	-	-	-	-	-
FG9: <i>Air and Missile Defense (AMD) Electronic Warfare</i>	-	52.672	47.098	-	-	-	-	-	-	-	-	-

**A. Mission Description and Budget Item Justification**

Funding in this program supports Cyber and Electromagnetic Activities (CEMA) efforts to conduct operational realistic assessments of Army Integrated Fires performance, identify system vulnerabilities, and develop mitigations against threats across the Cyber and Electromagnetic spectrum. Army radars and sensors, integrated air and missile defense mission command and fire control, Radio Frequency (RF) data and voice networks, and Positioning, Navigation, and Timing (PNT) technology will be assessed against current and postulated threat systems and techniques. Potential solutions developed by the Army, other Services, and Defense agencies (for example Missile Defense Agency) to close identified gaps will be demonstrated and assessed in live and simulated CEMA environments. Assessment events will be conducted approximately every two years. Implementation of potential solutions will occur between events using system-specific funding. The proposed solutions will then be assessed at the next event after implementation.

Included in this line are funds to plan and execute periodic CEMA activities with Army Integrated Fires systems, to include other Service and other Agency radar and sensor systems as appropriate. Upon completion of CEMA demonstration analyses, funding will facilitate initial recommendations for potential mitigations and solutions to Army sensors, C2, and RF data link vulnerabilities. Efforts in this program will also develop tools for use by Army radar and sensor systems to improve overall system performance in contested environments, to include effects-based CEMA Modeling and Simulation (M&S) to assess Army CEMA concepts in Hardware-In-The-Loop (HWIL) environment. Additionally, virtual models of critical hardware and software are being developed and implemented to allow for destructive testing with advanced CEMA threats in a lab environment. There will be continual interface with intelligence communities to maintain cognizance of emerging CEMA threats and incorporate these threats in future CEMA demonstrations. These activities follow a time-phased roadmap that identifies the investments needed to improve the resiliency of Army radar and sensors, C2, and RF data and voice networks in contested CEMA environments.

FY 2021 base funding of \$26.482 million will be used to plan and execute the FY 2021 Survivability Exercise to assess the performance of the Army Integrated Fires architecture, with Joint participants, in a live, tactically relevant, contested CEMA environment. Funds will be used to analyze the performance data of the FY 2021 Survivability Exercise participant weapon systems, identify vulnerabilities, and develop rapid mitigation concepts. Additionally, the funds will be used to execute Cyber Table Tops, continue the development of virtualized critical hardware and software, conduct destructive cyber vulnerability assessments, and integrate artificial intelligence and machine learning into weapon systems to mitigate current and future CEMA threats. FY 2021 OCO funding of \$.500 million will be used to complete operational assessment of ALPS prototype systems in support of a Combatant Commander.

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**Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Army** **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040: <i>Research, Development, Test &amp; Evaluation, Army / BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0603327A / <i>Air and Missile Defense Systems Engineering</i>
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<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022 Base</b>	<b>FY 2022 OCO</b>	<b>FY 2022 Total</b>
Previous President's Budget	52.980	26.982	0.500	-	0.500
Current President's Budget	52.672	47.098	0.000	-	0.000
Total Adjustments	-0.308	20.116	-0.500	-	-0.500
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-6.400			
• Congressional Rescissions	-	-			
• Congressional Adds	-	27.500			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.308	-0.984			
• Adjustments to Budget Years	-	-	-0.500	-	-0.500

**Congressional Add Details (\$ in Millions, and Includes General Reductions)**

**Project:** FG9: *Air and Missile Defense (AMD) Electronic Warfare*

Congressional Add: *Interoperability of integrated air and missile defense.*

Congressional Add: *Artificial Intelligence and Machine Learning*

Congressional Add: *Cyber and Supply Chain Resiliency*

Congressional Add: *Program increase - cyber and supply chain resiliency*

Congressional Add: *Program increase - machine learning for integrated fires*

Congressional Add Subtotals for Project: FG9

Congressional Add Totals for all Projects

	<b>FY 2020</b>	<b>FY 2021</b>
	15.000	-
	25.000	-
	5.000	-
	-	22.500
	-	5.000
Congressional Add Subtotals for Project: FG9	45.000	27.500
Congressional Add Totals for all Projects	45.000	27.500

**Change Summary Explanation**

\$0.500 million of funds were realigned under PE 0604741A - Air Defense Command, Control and Intelligence - Eng Dev Project 126.



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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army										<b>Date:</b> May 2021		
<b>Appropriation/Budget Activity</b> 2040 / 4					<b>R-1 Program Element (Number/Name)</b> PE 0603327A / Air and Missile Defense Systems Engineering				<b>Project (Number/Name)</b> FG9 / Air and Missile Defense (AMD) Electronic Warfare			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022 Base</b>	<b>FY 2022 OCO</b>	<b>FY 2022 Total</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>FY 2026</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
FG9: Air and Missile Defense (AMD) Electronic Warfare	-	52.672	47.098	-	-	-	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**Note**

Beginning in FY 2022, the Army Long-Range Persistent Surveillance (ALPS) system efforts transition to Program Element 0604741A, Project 126.

**A. Mission Description and Budget Item Justification**

Funding in this program supports Cyber and Electromagnetic Activities (CEMA) efforts to conduct operational realistic assessments of Army Integrated Fires performance, identify system vulnerabilities, and develop mitigations against threats across the Cyber and Electromagnetic spectrum. Army radars and sensors, integrated air and missile defense mission command and fire control, Radio Frequency (RF) data and voice networks, and Positioning, Navigation, and Timing (PNT) technology will be assessed against current and postulated threat systems and techniques. Potential solutions developed by the Army, other Services, and Defense agencies (for example Missile Defense Agency) to close identified gaps will be demonstrated and assessed in live and simulated CEMA environments. Assessment events will be conducted approximately every two years. Implementation of potential solutions will occur between events using system-specific funding. The proposed solutions will then be assessed at the next event after implementation.

Included in this line are funds to plan and execute periodic CEMA activities with Army Integrated Fires systems, to include other Service and other Agency radar and sensor systems as appropriate. Upon completion of CEMA demonstration analyses, funding will facilitate initial recommendations for potential mitigations and solutions to Army sensors, C2, and RF data link vulnerabilities. Efforts in this program will also develop tools for use by Army radar and sensor systems to improve overall system performance in contested environments, to include effects-based CEMA Modeling and Simulation (M&S) to assess Army CEMA concepts in Hardware-In-The-Loop (HWIL) environment. Additionally, virtual models of critical hardware and software are being developed and implemented to allow for destructive testing with advanced CEMA threats in a lab environment. There will be continual interface with intelligence communities to maintain cognizance of emerging CEMA threats and incorporate these threats in future CEMA demonstrations. These activities follow a time-phased roadmap that identifies the investments needed to improve the resiliency of Army radar and sensors, C2, and RF data and voice networks in contested CEMA environments.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
<b>Title:</b> Advanced Electronic Protection Enhancements	7.672	19.598	-
<b>Description:</b> Provides Cyber and Electromagnetic Activities (CEMA) planning, conducts CEMA demonstrations and post-mission analysis.			
<b>FY 2021 Plans:</b> Funds will be used to plan and execute the FY 2021 Survivability Exercise to assess the performance of the Army Integrated Fires architecture, with Joint participants, in a live, tactically relevant, contested CEMA environment. Funds will be used to analyze the			

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army		<b>Date:</b> May 2021		
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603327A / Air and Missile Defense Systems Engineering	<b>Project (Number/Name)</b> FG9 / Air and Missile Defense (AMD) Electronic Warfare		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
performance data of the FY 2021 Survivability Exercise participant weapon systems, identify vulnerabilities, and develop rapid mitigation concepts. Additionally, the funds will be used to execute Cyber Table Tops, continue the development of virtualized critical hardware and software, conduct destructive cyber vulnerability assessments, and integrate artificial intelligence and machine learning into weapon systems to mitigate current and future CEMA threats.				
<b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> Funding realigned under PE 0604741A - Air Defense Command, Control and Intelligence - Eng Dev Project 126.				
<b>Accomplishments/Planned Programs Subtotals</b>		7.672	19.598	-
		<b>FY 2020</b>	<b>FY 2021</b>	
<b>Congressional Add:</b> Interoperability of integrated air and missile defense.		15.000	-	
<b>FY 2020 Accomplishments:</b> Continue efforts to accelerate the development of networked systems able to operate within rapidly evolving threat timelines and in degraded environments. FY20 planned activities include a Kill Chain Architecture Study, trades development, analysis, and acquisition of integration tools.				
<b>Congressional Add:</b> Artificial Intelligence and Machine Learning		25.000	-	
<b>FY 2020 Accomplishments:</b> - Integrate Machine Learning (ML) technology into Army Air and Missile Defense (AMD) weapon systems. - Design, code, and integrate ML technology into existing CEMA Detection Algorithm (CDA). - Assess applicability of ML CEMA algorithms for use in Army warfighter Training Aids, Devices, Simulator, and Simulations (TADSS). - Initiated efforts to detect and recognize the effects of cyber, Positioning, Navigation, and Timing (PNT), and Electronic Warfare (EW) attacks.				
<b>Congressional Add:</b> Cyber and Supply Chain Resiliency		5.000	-	
<b>FY 2020 Accomplishments:</b> - Develop innovative technology to identify and mitigate cyber and supply chain risks to PEO MS weapon system programs. - Build a coordinated and consolidated system security engineering support capability to achieve cyber and supply chain survivability and resiliency. - Develop processes to evaluate suppliers and quantify risks to the PEO MS weapon systems. - Improve information analytics and integrate technical disciplines while providing cooperative supply chain risk analyses and cyber risk identification.				
<b>Congressional Add:</b> Program increase - cyber and supply chain resiliency		-	22.500	

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**Exhibit R-2A, RDT&E Project Justification:** PB 2022 Army **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603327A / Air and Missile Defense Systems Engineering	<b>Project (Number/Name)</b> FG9 / Air and Missile Defense (AMD) Electronic Warfare
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	FY 2020	FY 2021
<p><b>FY 2021 Plans:</b> - Continue developing innovative technology to identify and mitigate cyber and supply chain risks to PEO MS weapon system programs.</p> <ul style="list-style-type: none"> <li>- Build a coordinated and consolidated system security engineering support capability to achieve cyber and supply chain survivability and resiliency.</li> <li>- Continue to develop processes to evaluate suppliers and quantify risks to the PEO MS weapon systems.</li> <li>- Improve information analytics and integrate technical disciplines while providing cooperative supply chain risk analyses and cyber risk identification.</li> </ul>		
<p><b>Congressional Add:</b> Program increase - machine learning for integrated fires</p> <p><b>FY 2021 Plans:</b> - Continue Integration of Machine Learning (ML) technology into Army Air and Missile Defense (AMD) weapon systems.</p> <ul style="list-style-type: none"> <li>- Continue design, code, and integrate ML technology into existing CEMA Detection Algorithm (CDA).</li> <li>- Assess applicability of ML CEMA algorithms for use in Army warfighter Training Aids, Devices, Simulator, and Simulations (TADSS).</li> <li>- Continue efforts to detect and recognize the effects of cyber, Positioning, Navigation, and Timing (PNT), and Electronic Warfare (EW) attacks.</li> </ul>	-	5.000
<b>Congressional Adds Subtotals</b>	45.000	27.500

**C. Other Program Funding Summary (\$ in Millions)**

N/A

**Remarks**

**D. Acquisition Strategy**

Assessment events will be conducted approximately every two years in live and simulated CEMA environments. In addition to Government planning and conduct of assessments, funding will also be provided through various contracts for subject matter expertise.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army												Date: May 2021			
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)							
2040 / 4				PE 0603327A / Air and Missile Defense Systems Engineering				FG9 / Air and Missile Defense (AMD) Electronic Warfare							
Management Services (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Government Program Management	Various	Various : Various	4.519	0.907	Nov 2019	0.926	Nov 2020	-		-		-	Continuing	Continuing	Continuing
<b>Subtotal</b>			4.519	0.907		0.926		-		-		-	Continuing	Continuing	N/A
Product Development (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
System Integration Assessment	Various	Various : Various	4.378	2.693	Nov 2019	2.568	Nov 2020	-		-		-	Continuing	Continuing	Continuing
Interoperability of Integrated AMD	SS/CPFF	Various : Various	35.000	14.968	Feb 2020	-		-		-		-	0.000	49.968	-
Cyber and Supply Chain Resiliency	Various	Various : Various	-	3.273	Mar 2020	5.000		-		-		-	0.000	8.273	-
Artificial Intelligence and Machine Learning	Various	Various : Various	-	14.667	Feb 2020	22.500		-		-		-	0.000	37.167	-
ALPS Development/ Integration	Various	Various : Various	36.326	0.458	Jan 2020	0.482	Jan 2020	-		-		-	0.000	37.266	-
<b>Subtotal</b>			75.704	36.059		30.550		-		-		-	Continuing	Continuing	N/A
Support (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Component Assessments & Research and Trade Studies	Various	Various : Various	18.362	10.982	Feb 2020	8.801	Feb 2021	-		-		-	Continuing	Continuing	Continuing
<b>Subtotal</b>			18.362	10.982		8.801		-		-		-	Continuing	Continuing	N/A

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<b>Exhibit R-3, RDT&amp;E Project Cost Analysis: PB 2022 Army</b>												<b>Date:</b> May 2021				
<b>Appropriation/Budget Activity</b> 2040 / 4				<b>R-1 Program Element (Number/Name)</b> PE 0603327A / Air and Missile Defense Systems Engineering				<b>Project (Number/Name)</b> FG9 / Air and Missile Defense (AMD) Electronic Warfare								
<b>Test and Evaluation (\$ in Millions)</b>				<b>FY 2020</b>		<b>FY 2021</b>		<b>FY 2022 Base</b>		<b>FY 2022 OCO</b>		<b>FY 2022 Total</b>				
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>	
Demonstration Planning and Execution	Various	Various : Various	11.070	4.724	Nov 2019	6.821	Nov 2020	-		-		-	Continuing	Continuing	Continuing	
<b>Subtotal</b>			11.070	4.724		6.821		-		-		-	Continuing	Continuing	N/A	
			<b>Prior Years</b>	<b>FY 2020</b>	<b>FY 2021</b>		<b>FY 2022 Base</b>		<b>FY 2022 OCO</b>		<b>FY 2022 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>		
<b>Project Cost Totals</b>			109.655	52.672	47.098		-		-		-	Continuing	Continuing	N/A		
<b>Remarks</b>																

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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2022 Army</b>			<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603327A / Air and Missile Defense Systems Engineering	<b>Project (Number/Name)</b> FG9 / Air and Missile Defense (AMD) Electronic Warfare	

Event Name	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
P-12 Demonstration	████████				████████																							
P-12 Analysis Efforts, Trade Studies, and Implementation	████████				████████																							
FY21 Survivability Exercise Planning Efforts	████████				████████																							
FY21 Survivability Exercise	████████				████████																							
FY21 Survivability Exercise Analysis and Trade Studies	████████				████████																							
FY 21 Survivability Exercise Report and Implementation	████████				████████																							
Air and Missile Defense Systems Hardware Virtualization	████████				████████																							
Interoperability of Integrated Air and Missile Defense (Congress	████████				████████																							

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603327A / Air and Missile Defense Systems Engineering	<b>Project (Number/Name)</b> FG9 / Air and Missile Defense (AMD) Electronic Warfare

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
P-11 Demonstration	2	2018	3	2018
P-11 Analysis Efforts, Trade Studies, and Implementation	3	2018	1	2019
P-12 Demonstration Planning Efforts	4	2018	4	2019
P-12 Demonstration	4	2019	1	2020
P-12 Analysis Efforts, Trade Studies, and Implementation	1	2020	4	2020
FY21 Survivability Exercise Planning Efforts	4	2020	2	2021
FY21 Survivability Exercise	2	2021	3	2021
FY21 Survivability Exercise Analysis and Trade Studies	3	2021	1	2022
FY 21 Survivability Exercise Report and Implementation	2	2022	4	2022
Air and Missile Defense Systems Hardware Virtualization	2	2019	4	2022
Interoperability of Integrated Air and Missile Defense (Congressional Adds)	4	2018	2	2021

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2022 Army **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040: <i>Research, Development, Test &amp; Evaluation, Army / BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0603619A / <i>Landmine Warfare and Barrier - Adv Dev</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	-	79.504	56.067	50.314	-	50.314	-	-	-	-	-	-
606: <i>Cntrmn/Barrier Adv Dev</i>	-	-	2.000	-	-	-	-	-	-	-	-	-
BU5: <i>Standoff Volcano Obstacle (SAVO) Adv Tech</i>	-	14.049	6.702	3.951	-	3.951	-	-	-	-	-	-
CE5: <i>Breaching Capability Development - Mounted</i>	-	-	-	5.922	-	5.922	-	-	-	-	-	-
EK7: <i>Area Denial Capability Development</i>	-	65.455	47.365	40.441	-	40.441	-	-	-	-	-	-

**Note**

Project 606 / Breaching Capability Development - Mounted within Program Element (PE) 0603619A / Landmine Warfare and Barrier - Adv Dev restructures to Project CE5 / Breaching Capability Development - Mounted within PE 0603619A / Landmine Warfare and Barrier - Adv Dev in Fiscal Year (FY) 2022.

**A. Mission Description and Budget Item Justification**

This PE provides for the Concept Exploration and Refinement of Terrain Shaping Obstacles and develops modernized alternatives to the Family of Scatterable Mines systems.

Projects 606 and CE5 - The current mounted breaching system, the M58 Mine Clearing Line Charge (MICLIC), is a rocket-projected explosive line charge that was initially fielded over 50 years ago and is becoming increasingly less effective against modernized threat obstacles. This effort will focus on the development of the Next Generation Mounted Breaching system as a modular mission payload which will provide greater effectiveness against current and emerging threat obstacles and enhance operational reliability, supportability, mobility and survivability beyond the current state. This new capability and payload will be compatible for use on existing and future platforms including Next Generation Combat Vehicle - Remote Combat Vehicle-Medium (NGCV RCV-M).

Project BU5 -Standoff Activated Volcano Obstacle (SAVO) supports the United States Army Europe (USAREUR) Operational Needs Statement (ONS) # 18-22702 as well as revisions to the Multiple Delivery Mine System (Volcano) Joint Service Operational Requirement (JSOR) # 0683. SAVO is the top priority capability in the Army's Mobility portfolio. This capability will allow for a formation of pre-emplaced directed obstacles that can be initiated remotely via fielded wired or wireless initiation systems. SAVO can be initiated via one of three fielded systems; the M7 Spider Networked Munition System, the MK152/M156 Remote Activation Munition Systems (RAMS), or the CD450-4J Blasting Machine. SAVO has the ability to create a complex obstacle when combined with Top Attack systems such as the XM204 Interim Top Attack system. The primary item is the newly developed SAVO base plate which is placed on the ground and has four ports to connect fielded Volcano mine canisters. The base plate is packaged with ancillary components to aid in emplacement such as initiation wire, stabilizing ground stakes, sand bags, and canister carrying straps. If the emplaced obstacle is not initiated, SAVO can be recovered for future re-deployment. This item is compliant with the U.S. National landmine policy and supports the U.S. Army modernization priorities in support of the National Defense Strategy. SAVO Trainer base plates will reflect the form, fit, function, and weight of the tactical SAVO



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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2022 Army	<b>Date:</b> May 2021
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<b>Appropriation/Budget Activity</b> 2040: <i>Research, Development, Test &amp; Evaluation, Army / BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0603619A / <i>Landmine Warfare and Barrier - Adv Dev</i>
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base plate. Trainer base plates interface with the fielded Volcano training canisters and are reusable. Upon receipt of a launch signal from a fielded initiation system, the training base plates produce sight and sound effects to effectively represent the SAVO obstacle's mine launch and armed status functionality.

Project EK7 - Project EK7 Area Denial Capability Development provides for the advanced capability development of Close Terrain Shaping Obstacle (CTSO) systems and develops modernized, non-persistent, U.S. Landmine policy compliant munition fields. During joint, multi-domain, high intensity conflict CTSO systems disrupt, fix, turn and block enemy freedom of maneuver while enhancing friendly freedom of maneuver within the same battle space. CTSO systems enable maneuver commanders to directly influence where battlefield engagements occur. CTSO systems will replace the Family of Scatterable Mines (FASCAM) systems which are nearing their end of useful life. CTSO systems are a networked munition capability suite composed of top and bottom attack munitions which can be employed independently or together to create a controlled, scalable complex obstacle. The project will evaluate integrated technologies and develop prototype systems in a realistic operating environment for the next generation of CTSO systems to achieve doctrinally required obstacle effects during combat operations. CTSO systems will use an open system and modular architecture to facilitate future development, maintenance, repair, and product improvements. The enduring CTSO capability development supports the approved Army Futures Command (AFC) Terrain Shaping Strategy for Land Domain and multi-domain operations (MDO). Full TSO capabilities will be developed through a series of capability insertions as approved by the Army Acquisition Executive on Feb 19, 2020. The XM204 Interim Top Attack system, the first CTSO capability insertion, supports a United States Army Europe (USAREUR) Operational Needs Statement (ONS) # 18-22702. XM204 can operate independently but can be used in conjunction with the Standoff Activated Volcano Obstacle (SAVO) system to create a complex obstacle. Follow on capability insertions will develop a Common Anti-Vehicular Munition (CAVM) which will be suitable for multiple delivery methods. Follow on capabilities will also include remote command and control, recoverability after arming, self-reporting, and full network capability.

<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022 Base</b>	<b>FY 2022 OCO</b>	<b>FY 2022 Total</b>
Previous President's Budget	82.915	64.092	44.621	-	44.621
Current President's Budget	79.504	56.067	50.314	-	50.314
Total Adjustments	-3.411	-8.025	5.693	-	5.693
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-7.686			
• Congressional Rescissions	-	-			
• Congressional Adds	-	2.000			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-3.411	-2.339			
• Adjustments to Budget Years	-	-	5.693	-	5.693

**Congressional Add Details (\$ in Millions, and Includes General Reductions)**

**Project:** 606: *Cntrmn/Barrier Adv Dev*

Congressional Add: *Program increase - M58 mine clearing line charge*

	<b>FY 2020</b>	<b>FY 2021</b>
	-	2.000

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2022 Army	<b>Date:</b> May 2021
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<b>Appropriation/Budget Activity</b> 2040: <i>Research, Development, Test &amp; Evaluation, Army / BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0603619A / <i>Landmine Warfare and Barrier - Adv Dev</i>
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**Congressional Add Details (\$ in Millions, and Includes General Reductions)**

	FY 2020	FY 2021
Congressional Add Subtotals for Project: 606	-	2.000
Congressional Add Totals for all Projects	-	2.000

**Change Summary Explanation**

Fiscal Year 2022 (FY22) funding increase in the amount of \$5.693 million is due to a restructuring of a requirement of \$5.922 million to support Project CE5 - Breaching Capability Development-Mounted, funding increase in the amount of \$3.951 million for BU5-Standoff Activated Volcano Obstacle, funding decrease in the amount of \$3.842 million for EK7-Area Denial Capability Development and decrease in the amount of \$0.338 million for manpower that was realigned to Operations and Maintenance from Project EK7 - Area Denial Capability Development. Program support costs have been accurately updated to reflect the realignments.

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**Exhibit R-2A, RDT&E Project Justification:** PB 2022 Army **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603619A / Landmine Warfare and Barrier - Adv Dev	<b>Project (Number/Name)</b> 606 / Cntrmn/Barrier Adv Dev
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
606: Cntrmn/Barrier Adv Dev	-	-	2.000	-	-	-	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**Note**

Project 606 / Breaching Capability Development - Mounted within Program Element (PE) 0603619A / Landmine Warfare and Barrier - Adv Dev restructures to Project CE5 / Breaching Capability Development - Mounted within PE 0603619A / Landmine Warfare and Barrier - Adv Dev in Fiscal Year (FY) 2022.

**A. Mission Description and Budget Item Justification**

The current mounted breaching system, the M58 Mine Clearing Line Charge (MICLIC), is a rocket-projected explosive line charge that was initially fielded over 50 years ago and is becoming increasingly less effective against modernized threat obstacles. This effort will focus on the development of the Next Generation Mounted Breaching system as a modular mission payload which will provide greater effectiveness against current and emerging threat obstacles and enhance operational reliability, supportability, mobility and survivability beyond the current state. This new capability and payload will be compatible for use on existing and future platforms including Next Generation Combat Vehicle - Remote Combat Vehicle-Medium (NGCV RCV-M). FY 2021 supports the development of a scalable and adjustable breaching capability that can neutralize all current and future landmines regardless of triggering type and be employed by autonomous and/or semi-autonomous systems to replace the current MICLIC capability.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	FY 2020	FY 2021
<b>Congressional Add:</b> Program increase - M58 mine clearing line charge	-	2.000
<b>FY 2021 Plans:</b> Begin Technology Maturation and Risk Reduction (TMRR) efforts to be implemented into future prototyping efforts		
<b>Congressional Adds Subtotals</b>	-	2.000

**C. Other Program Funding Summary (\$ in Millions)**

Line Item	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
• CE5: Breaching Capability Development - Mounted	-	-	5.922	-	5.922	-	-	-	-	-	-

**Remarks**

Project 606 / Breaching Capability Development - Mounted within PE 0603619A / Landmine Warfare and Barrier - Adv Dev restructures to Project CE5 / Breaching Capability Development - Mounted within PE 0603619A / Landmine Warfare and Barrier - Adv Dev in FY 2022.

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603619A / <i>Landmine Warfare and Barrier - Adv Dev</i>	<b>Project (Number/Name)</b> 606 / <i>Cntrmn/Barrier Adv Dev</i>

**D. Acquisition Strategy**

Breaching technologies initiated through the Next Generation Breaching Technology Science & Technology effort will be transitioned for maturation and fielding. Initial effort will focus on the target defeat mechanism and risk reduction ahead of a prototype build and technology demonstration. Upon successful demonstration, this target defeat capability will then be fully integrated with detection, marking and delivery systems to provide the full breaching capability in a modular mission payload. This payload will then be fielded on multiple platforms to include the planned Next Generation Combat Vehicle - Remote Combat Vehicle-Medium (NGCV RCV-M) and existing M1150 Assault Breacher Vehicle.

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army** **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603619A / Landmine Warfare and Barrier - Adv Dev	<b>Project (Number/Name)</b> 606 / Cntrmn/Barrier Adv Dev
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<b>Product Development (\$ in Millions)</b>				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Capability Development	MIPR	DEVCOM Armaments Center : Picatinny Arsenal, NJ	-	-		1.652	Apr 2021	-		-		-	0.000	1.652	-
<b>Subtotal</b>			-	-		1.652		-		-		-	0.000	1.652	N/A

<b>Support (\$ in Millions)</b>				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Platform Integration Support	MIPR	DEVCOM C5ISR : Aberdeen, MD	-	-		0.178	May 2021	-		-		-	0.000	0.178	-
Vehicle Integration Support	MIPR	DEVCOM Ground Vehicle Systems Center (GVSC) : Warren, MI	-	-		0.114	May 2021	-		-		-	0.000	0.114	-
Testing Planning Support	MIPR	Engineer Research and Development Center (ERDC) : Vicksburg, MS	-	-		0.056	May 2021	-		-		-	0.000	0.056	-
<b>Subtotal</b>			-	-		0.348		-		-		-	0.000	0.348	N/A

	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
<b>Project Cost Totals</b>		-	-	2.000	-	-	0.000	2.000	N/A

**Remarks**

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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2022 Army</b>		<b>Date: May 2021</b>
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603619A / Landmine Warfare and Barrier - Adv Dev	<b>Project (Number/Name)</b> 606 / Cntrmn/Barrier Adv Dev

Event Name	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
<b>Breacher Development</b>																												
Milestone A																												
Technology Maturation and Risk Reduction																												
TMRR Development Contract Award																												
Experimentation Testing																												
Prototype Contract Award																												
Design Verification Testing																												
Milestone B																												

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603619A / <i>Landmine Warfare and Barrier - Adv Dev</i>	<b>Project (Number/Name)</b> 606 / <i>Cntrmn/Barrier Adv Dev</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Breacher Development	4	2020	4	2020
Milestone A	3	2021	3	2021
Technology Maturation and Risk Reduction	3	2021	4	2023
TMRR Development Contract Award	2	2022	2	2022
Experimentation Testing	4	2022	1	2023
Prototype Contract Award	2	2023	2	2023
Design Verification Testing	4	2023	4	2023
Milestone B	4	2023	4	2023

**Note**

Project 606 / Breaching Capability Development - Mounted within PE 0603619A / Landmine Warfare and Barrier - Adv Dev transitions to Project CE5 / Breaching Capability Development - Mounted within PE 0603619A / Landmine Warfare and Barrier - Adv Dev in FY 2022

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army										<b>Date:</b> May 2021		
<b>Appropriation/Budget Activity</b> 2040 / 4					<b>R-1 Program Element (Number/Name)</b> PE 0603619A / Landmine Warfare and Barrier - Adv Dev				<b>Project (Number/Name)</b> BU5 / Standoff Volcano Obstacle (SAVO) Adv Tech			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022 Base</b>	<b>FY 2022 OCO</b>	<b>FY 2022 Total</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>FY 2026</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
BU5: Standoff Volcano Obstacle (SAVO) Adv Tech	-	14.049	6.702	3.951	-	3.951	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

Project BU5 Standoff Activated Volcano Obstacle (SAVO) supports the United States Army Europe (USAREUR) Operational Needs Statement (ONS) # 18-22702 as well as revisions to the Multiple Delivery Mine System (Volcano) Joint Service Operational Requirement (JSOR) # 0683. SAVO is the top priority capability in the Army's Mobility portfolio. This capability will allow for a formation of pre-emplaced directed obstacles that can be initiated remotely via fielded wired or wireless initiation systems.

SAVO can be initiated via one of three fielded systems; the M7 Spider Networked Munition System, the MK152/M156 Remote Activation Munition Systems (RAMS), or the CD450-4J Blasting Machine. SAVO has the ability to create a complex obstacle when combined with Top Attack systems such as the XM204 Interim Top Attack system. The primary item is the newly developed SAVO base plate which is placed on the ground and has four ports to connect fielded Volcano mine canisters. The base plate is packaged with ancillary components to aid in emplacement such as initiation wire, stabilizing ground stakes, sand bags, and canister carrying straps. If the emplaced obstacle is not initiated, SAVO can be recovered for future re-deployment.

This item is compliant with the U.S. National landmine policy and supports the U.S. Army modernization priorities in support of the National Defense Strategy.

SAVO Trainer base plates will reflect the form, fit, function, and weight of the tactical SAVO base plate. Trainer base plates interface with the fielded Volcano training canisters and are reusable. Upon receipt of a launch signal from a fielded initiation system, the training base plates produce sight and sound effects to effectively represent the SAVO obstacle's mine launch and armed status functionality.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
<b>Title:</b> SAVO Rapid Prototyping	11.798	2.236	0.386
<b>Description:</b> SAVO system Rapid Prototyping phase.			
<b>FY 2021 Plans:</b> Continue to perform the SAVO system Rapid Prototyping phase to include: continuation of Rapid Prototyping efforts, conduct design review, and begin qualification testing efforts.			
<b>FY 2022 Plans:</b> Complete Rapid Prototyping, complete qualification testing, and conduct operational demonstration.			
<b>FY 2021 to FY 2022 Increase/Decrease Statement:</b>			



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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army		<b>Date:</b> May 2021		
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603619A / Landmine Warfare and Barrier - Adv Dev	<b>Project (Number/Name)</b> BU5 / Standoff Volcano Obstacle (SAVO) Adv Tech		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
Fiscal Year (FY) 2022 funding decrease due to the completion of Rapid Prototyping activities.				
<b>Title:</b> Engineering Support <b>Description:</b> Provide Engineering Support.  <b>FY 2021 Plans:</b> Continue to perform OGA and contract engineering support to the Integrated Product Team supporting the continued Rapid Prototyping effort.  <b>FY 2022 Plans:</b> Continue to perform government and contract engineering support to the Integrated Product Team supporting the completion of the Rapid Prototyping effort and an urgent material release.  <b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> FY 2022 funding decrease due to reduction of support team required for completion of Rapid Prototyping and transition of program to production.		1.941	2.172	1.801
<b>Title:</b> SAVO Management Services <b>Description:</b> Program Management and Support  <b>FY 2021 Plans:</b> Continue to perform program management of the SAVO program.  <b>FY 2022 Plans:</b> Continue to perform program management of the SAVO program and the transition to production.  <b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> FY 2022 funding decrease due to reduction of travel and labor requirements needed to complete Rapid Prototyping and transition of program to production.		0.136	0.679	0.178
<b>Title:</b> SAVO Test & Evaluation <b>Description:</b> Provides support to Contractor/Government test activities.  <b>FY 2021 Plans:</b> Continue to perform test and evaluation activities and begin qualification testing on prototype systems.  <b>FY 2022 Plans:</b>		0.174	1.615	1.586

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603619A / <i>Landmine Warfare and Barrier - Adv Dev</i>	<b>Project (Number/Name)</b> BU5 / <i>Standoff Volcano Obstacle (SAVO) Adv Tech</i>

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
Complete government qualification testing and conduct operational demonstration.			
<b><i>FY 2021 to FY 2022 Increase/Decrease Statement:</i></b> FY 2022 funding decrease due to requirements to support qualification testing, operational demonstration and urgent material release.			
<b>Accomplishments/Planned Programs Subtotals</b>	14.049	6.702	3.951

<b>C. Other Program Funding Summary (\$ in Millions)</b>											
<b>Line Item</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022 Base</b>	<b>FY 2022 OCO</b>	<b>FY 2022 Total</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>FY 2026</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
• F76740: <i>Standoff Activated Volcano Obstacle</i>	-	-	4.685	-	4.685	-	-	-	-	-	-

**Remarks**

**D. Acquisition Strategy**

SAVO will utilize a Middle Tier of Acquisition pathway for Rapid Prototyping and Fielding in accordance with Section 804 of the 2016 NDAA. The Rapid Prototyping phase will leverage 10 U.S.C. 2371b "Other Transaction Authority" to award a competitive prototype contract. Prototypes will undergo a series of developmental tests ahead of qualification testing and operational demonstration to support Initial Operational Capability scheduled for FY 2023.

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army** **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603619A / Landmine Warfare and Barrier - Adv Dev	<b>Project (Number/Name)</b> BU5 / Standoff Volcano Obstacle (SAVO) Adv Tech
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<b>Management Services (\$ in Millions)</b>				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
SAVO Program Management Travel and Support	Various	PM Close Combat Systems : Picatinny Arsenal, NJ	-	0.061	Jan 2020	0.267	Feb 2021	0.100	Oct 2021	-		0.100	0.000	0.428	-
SAVO Contractor Support	C/FFP	BOWHEAD : Alexandria VA	-	-		0.187	Jun 2021	0.078	Mar 2022	-		0.078	0.000	0.265	-
SAVO Contractor Support	C/FFP	Booz Allen Hamilton : Dover, NJ	-	0.075	Nov 2021	0.225	May 2021	-		-		-	0.000	0.300	-
<b>Subtotal</b>			-	0.136		0.679		0.178		-		0.178	0.000	0.993	N/A

<b>Product Development (\$ in Millions)</b>				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Hardware Development	C/CPFF	Northrop Grumman Defense Systems : Plymouth, MN	-	11.789	May 2020	2.236	Jan 2021	0.386	Dec 2021	-		0.386	0.000	14.411	-
Prototype Components	MIPR	DEVCOM Armaments Center : Picatinny Arsenal, NJ	-	0.009	Mar 2020	-		-		-		-	0.000	0.009	-
<b>Subtotal</b>			-	11.798		2.236		0.386		-		0.386	0.000	14.420	N/A

<b>Support (\$ in Millions)</b>				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
SAVO - Engineering Support	MIPR	DEVCOM Armaments Center : Picatinny Arsenal, NJ	-	1.917	Jan 2020	2.157	Jan 2021	1.781	Oct 2021	-		1.781	0.000	5.855	-
Human Research & Engineering (HRED) MANPRINT Support	MIPR	DEVCOM Army Research Laboratory - HRED : Aberdeen, MD	-	0.024	May 2020	0.015	Feb 2021	0.020	Dec 2021	-		0.020	0.000	0.059	-

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army** **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603619A / Landmine Warfare and Barrier - Adv Dev	<b>Project (Number/Name)</b> BU5 / Standoff Volcano Obstacle (SAVO) Adv Tech
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<b>Support (\$ in Millions)</b>				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
<b>Subtotal</b>			-	1.941		2.172		1.801		-		1.801	0.000	5.914	N/A

<b>Test and Evaluation (\$ in Millions)</b>				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Government Qualification Testing	MIPR	Yuma Test Center : Yuma, AZ	-	0.037	Apr 2020	0.972	Aug 2021	0.736	Dec 2021	-		0.736	0.000	1.745	-
Electronic Environmental Effects E3 Testing	MIPR	White Sands Test Center : White Sands, NM	-	0.035	May 2020	0.335	Aug 2021	0.250	Dec 2021	-		0.250	0.000	0.620	-
Electronic Environmental Effects E3 Testing	MIPR	Redstone Test Center : Huntsville, AL	-	0.102	Feb 2021	0.135	Aug 2021	0.100	Dec 2021	-		0.100	0.000	0.337	-
Electronic Environmental Effects E3 Testing	MIPR	DEVCOM Armaments Center : Picatinny Arsenal NJ	-	-		0.173	Aug 2021	0.100	Dec 2021	-		0.100	0.000	0.273	-
Operational Demonstration	MIPR	Various : Various	-	-		-		0.400	Dec 2021	-		0.400	0.000	0.400	-
<b>Subtotal</b>			-	0.174		1.615		1.586		-		1.586	0.000	3.375	N/A

	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
<b>Project Cost Totals</b>	-	14.049	6.702	3.951	-	3.951	0.000	24.702	N/A

**Remarks**

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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2022 Army</b>			<b>Date: May 2021</b>
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603619A / Landmine Warfare and Barrier - Adv Dev	<b>Project (Number/Name)</b> BU5 / Standoff Volcano Obstacle (SAVO) Adv Tech	

Event Name	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Rapid Prototyping Decision Review			▲ 1 Prototype Decision																									
Rapid Prototyping OTA			■																									
User Jury 1					▲ 2 User Jury 1																							
User Jury 2						▲ 3 User Jury 2																						
Design Review							▲ 4 Design Review																					
Qualification Testing									■																			
Operational Demonstration									▲ 5 Operational Demonstration																			
Rapid Fielding Decision Review									▲ 6 Rapid Fielding Decision Review																			
SAVO Production Contract											■																	
Urgent Materiel Release													▲ 7 UMR															
Initial Operational Capability															▲ 8 IOC													
Full Operational Capability																											▲ 9 FOC	

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603619A / <i>Landmine Warfare and Barrier - Adv Dev</i>	<b>Project (Number/Name)</b> BU5 / <i>Standoff Volcano Obstacle (SAVO) Adv Tech</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Rapid Prototyping Decision Review	3	2020	3	2020
Rapid Prototyping OTA	3	2020	4	2021
User Jury 1	2	2021	2	2021
User Jury 2	3	2021	3	2021
Design Review	4	2021	4	2021
Qualification Testing	4	2021	2	2022
Operational Demonstration	2	2022	2	2022
Rapid Fielding Decision Review	2	2022	2	2022
SAVO Production Contract	2	2022	2	2026
Urgent Materiel Release	2	2023	2	2023
Initial Operational Capability	3	2023	3	2023
Full Operational Capability	3	2026	3	2026

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**Exhibit R-2A, RDT&E Project Justification:** PB 2022 Army **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4					<b>R-1 Program Element (Number/Name)</b> PE 0603619A / Landmine Warfare and Barrier - Adv Dev				<b>Project (Number/Name)</b> CE5 / Breaching Capability Development - Mounted			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022 Base</b>	<b>FY 2022 OCO</b>	<b>FY 2022 Total</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>FY 2026</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
CE5: Breaching Capability Development - Mounted	-	-	-	5.922	-	5.922	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**Note**

Project 606 / Breaching Capability Development - Mounted within Program Element (PE) 0603619A / Landmine Warfare and Barrier - Adv Dev restructures to Project CE5 / Breaching Capability Development - Mounted within PE 0603619A / Landmine Warfare and Barrier - Adv Dev in Fiscal Year (FY) 2022.

**A. Mission Description and Budget Item Justification**

The current mounted breaching system, the M58 Mine Clearing Line Charge (MICLIC), is a rocket-projected explosive line charge that was initially fielded over 50 years ago and is becoming increasingly less effective against modernized threat obstacles. This effort will focus on the development of the Next Generation Mounted Breaching system as a modular mission payload which will provide greater effectiveness against current and emerging threat obstacles and enhance operational reliability, supportability, mobility and survivability beyond the current state. This new capability and payload will be compatible for use on existing and future platforms including Next Generation Combat Vehicle - Remote Combat Vehicle-Medium (NGCV RCV-M). FY 2022 supports the development of a scalable and adjustable breaching capability that can neutralize all current and future landmines regardless of triggering type and be employed by autonomous and/or semi-autonomous systems to replace the current MICLIC capability.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
<b>Title:</b> Next Generation Mounted Breaching	-	-	5.922
<b>Description:</b> Develop the Next Generation Mounted Breaching capability to engage modernized threat obstacles.			
<b>FY 2022 Plans:</b> Continue Technology Maturation and Risk Reduction (TMRR) efforts to be implemented into future prototyping efforts.			
<b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> Project 606 / Breaching Capability Development - Mounted within Program Element (PE) 0603619A / Landmine Warfare and Barrier - Adv Dev restructures to Project CE5 / Breaching Capability Development - Mounted within PE 0603619A / Landmine Warfare and Barrier - Adv Dev in FY 2022 to continue the development efforts for the Next Generation Mounted Breaching capability.			
<b>Accomplishments/Planned Programs Subtotals</b>	-	-	5.922

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603619A / <i>Landmine Warfare and Barrier - Adv Dev</i>	<b>Project (Number/Name)</b> CE5 / <i>Breaching Capability Development - Mounted</i>

**C. Other Program Funding Summary (\$ in Millions)**

<u>Line Item</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022</u> <u>Base</u>	<u>FY 2022</u> <u>OCO</u>	<u>FY 2022</u> <u>Total</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>FY 2026</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• 606: <i>Cntrmn/Barrier Adv Dev</i>	-	2.000	-	-	-	-	-	-	-	-	-

**Remarks**

**D. Acquisition Strategy**

Breaching technologies initiated through the Next Generation Breaching Technology Science & Technology effort will be transitioned for maturation and fielding. Initial effort will focus on the target defeat mechanism and risk reduction ahead of a prototype build and technology demonstration. Upon successful demonstration, this target defeat capability will then be fully integrated with detection, marking and delivery systems to provide the full breaching capability in a modular mission payload. This payload will then be fielded on multiple platforms to include the planned Next Generation Combat Vehicle - Remote Combat Vehicle-Medium (NGCV RCV-M) and existing M1150 Assault Breacher Vehicle.



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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army												Date: May 2021			
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)							
2040 / 4				PE 0603619A / Landmine Warfare and Barrier - Adv Dev				CE5 / Breaching Capability Development - Mounted							
Product Development (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
TMRR Development Contractor	C/TBD	TBD : TBD	-	-		-		2.200	Feb 2022	-		2.200	0.000	2.200	-
TMRR Development Government	MIPR	DEVCOM Armaments Center : Picatinny Arsenal, NJ	-	-		-		0.550	Oct 2021	-		0.550	0.000	0.550	-
<b>Subtotal</b>			-	-		-		2.750		-		2.750	0.000	2.750	N/A
Support (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Engineering Support	MIPR	DEVCOM Armaments Center : Picatinny Arsenal, NJ	-	-		-		1.072	Oct 2021	-		1.072	0.000	1.072	-
Platform Integration Support	MIPR	DEVCOM C5ISR : Aberdeen, MD	-	-		-		0.325	Oct 2021	-		0.325	0.000	0.325	-
Vehicle Integration Support	MIPR	DEVCOM Ground Vehicle Systems Center (GVSC) : Warren, MI	-	-		-		0.275	Oct 2021	-		0.275	0.000	0.275	-
<b>Subtotal</b>			-	-		-		1.672		-		1.672	0.000	1.672	N/A
Test and Evaluation (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Experimentation Testing	MIPR	Various : Various	-	-		-		1.500	Jul 2022	-		1.500	0.000	1.500	-
<b>Subtotal</b>			-	-		-		1.500		-		1.500	0.000	1.500	N/A

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<b>Exhibit R-3, RDT&amp;E Project Cost Analysis: PB 2022 Army</b>								<b>Date: May 2021</b>			
<b>Appropriation/Budget Activity</b> 2040 / 4			<b>R-1 Program Element (Number/Name)</b> PE 0603619A / <i>Landmine Warfare and Barrier - Adv Dev</i>			<b>Project (Number/Name)</b> CE5 / <i>Breaching Capability Development - Mounted</i>					
	<b>Prior Years</b>	<b>FY 2020</b>	<b>FY 2021</b>		<b>FY 2022 Base</b>	<b>FY 2022 OCO</b>		<b>FY 2022 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Project Cost Totals</b>	-	-	0.000		5.922	-		5.922	0.000	5.922	N/A

**Remarks**

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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2022 Army</b>		<b>Date: May 2021</b>
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603619A / <i>Landmine Warfare and Barrier - Adv Dev</i>	<b>Project (Number/Name)</b> CE5 / <i>Breaching Capability Development - Mounted</i>

Event Name	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026								
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4					
Milestone A					1 MS-A																												
Technology Maturation and Risk Reduction																																	
TMRR Development Contract Award													2 TMRR Award																				
Experimentation Testing																	Testing																
Prototype Contract Award																					3 Prototype Award												
Design Verification Testing																					DVT												
Milestone B																					4 MS-B												

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603619A / <i>Landmine Warfare and Barrier - Adv Dev</i>	<b>Project (Number/Name)</b> CE5 / <i>Breaching Capability Development - Mounted</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Milestone A	3	2021	3	2021
Technology Maturation and Risk Reduction	3	2021	4	2023
TMRR Development Contract Award	2	2022	2	2022
Experimentation Testing	4	2022	1	2023
Prototype Contract Award	2	2023	2	2023
Design Verification Testing	4	2023	4	2023
Milestone B	4	2023	4	2023

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army										<b>Date:</b> May 2021		
<b>Appropriation/Budget Activity</b> 2040 / 4					<b>R-1 Program Element (Number/Name)</b> PE 0603619A / <i>Landmine Warfare and Barrier - Adv Dev</i>				<b>Project (Number/Name)</b> EK7 / <i>Area Denial Capability Development</i>			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022 Base</b>	<b>FY 2022 OCO</b>	<b>FY 2022 Total</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>FY 2026</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
<i>EK7: Area Denial Capability Development</i>	-	65.455	47.365	40.441	-	40.441	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

Project EK7 Area Denial Capability Development provides for the advanced capability development of Close Terrain Shaping Obstacle (CTSO) systems and develops modernized, non-persistent, U.S. Landmine policy compliant munition fields. During joint, multi-domain, high intensity conflict CTSO systems disrupt, fix, turn and block enemy freedom of maneuver while enhancing friendly freedom of maneuver within the same battle space. CTSO systems enable maneuver commanders to directly influence where battlefield engagements occur. CTSO systems will replace the Family of Scatterable Mines (FASCAM) systems which are nearing their end of useful life.

CTSO systems are a networked munition capability suite composed of top and bottom attack munitions which can be employed independently or together to create a controlled, scalable complex obstacle. The project will evaluate integrated technologies and develop prototype systems in a realistic operating environment for the next generation of CTSO systems to achieve doctrinally required obstacle effects during combat operations. CTSO systems will use an open system and modular architecture to facilitate future development, maintenance, repair, and product improvements.

The enduring CTSO capability development supports the approved Army Futures Command (AFC) Terrain Shaping Strategy for Land Domain and multi-domain operations (MDO). Full TSO capabilities will be developed through a series of capability insertions as approved by the Army Acquisition Executive on Feb 19, 2020. The XM204 Interim Top Attack system, the first CTSO capability insertion, supports a United States Army Europe (USAREUR) Operational Needs Statement (ONS) # 18-22702. XM204 can operate independently but can be used in conjunction with the Standoff Activated Volcano Obstacle (SAVO) system to create a complex obstacle. Follow on capability insertions will develop a Common Anti-Vehicular Munition (CAVM) which will be suitable for multiple delivery methods. Follow on capabilities will also include remote command and control, recoverability after arming, self-reporting, and full network capability.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
<b>Title:</b> Terrain Shaping Obstacles Capability Development	52.735	32.195	24.539
<b>Description:</b> Develop, build, and demonstrate Terrain Shaping Obstacle common munitions system. Demonstrate system in an operationally relevant environment.			
<b>FY 2021 Plans:</b> Continue XM204 Interim Top Attack system prototyping efforts in support of qualification testing, continue dispenser launch module design development, and complete critical design review.			
<b>FY 2022 Plans:</b>			

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army		<b>Date:</b> May 2021		
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603619A / Landmine Warfare and Barrier - Adv Dev	<b>Project (Number/Name)</b> EK7 / Area Denial Capability Development		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
Complete XM204 Interim Top Attack system prototyping efforts in support of Operational Demonstration and Urgent Materiel Release. Award the Increment 1 Improved Top Attack Rapid Prototyping and CAVM development contract. <b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> Fiscal Year (FY) 2022 funding decrease due to the finalization of XM204 prototyping efforts and the start of Increment 1 Improved Top Attack development efforts.				
<b>Title:</b> Engineering Support <b>Description:</b> Provide engineering support for Terrain Shaping Capability. <b>FY 2021 Plans:</b> Continue to provide engineering support for Terrain Shaping Obstacle XM204 design, dispenser launch module design, integration, design verification, and design qualification. <b>FY 2022 Plans:</b> Provide engineering support for final XM204 Interim Top Attack system prototyping efforts, Operational Demonstration, and Urgent Materiel Release. <b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> FY 2022 funding increase due to support of both XM204 and engineering development of Increment 1 Improved Top Attack Capabilities.		11.074	11.288	12.440
<b>Title:</b> Program Management and Oversight <b>Description:</b> Program management and oversight of Terrain Shaping Obstacle Capability development and system evaluation. <b>FY 2021 Plans:</b> Continue to provide program management and oversight for munition development, dispenser launcher module development, integration, design verification, and design qualification. <b>FY 2022 Plans:</b> Provide program management and oversight of Terrain Shaping Obstacle in support of development of the Improved Top Attack Munition capabilities.		0.374	0.362	0.362
<b>Title:</b> Test & Evaluation <b>Description:</b> Conduct testing and evaluation of Terrain Shaping Obstacle Capability performance. <b>FY 2021 Plans:</b>		1.272	3.520	3.100

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603619A / Landmine Warfare and Barrier - Adv Dev	<b>Project (Number/Name)</b> EK7 / Area Denial Capability Development

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
Conduct qualification testing to evaluate technical performance, reliability, and safety of the XM204 Interim Top Attack System. Conduct Critical Design Review (CDR).			
<b>FY 2022 Plans:</b> Conduct final Safety and Suitability tests for XM204 culminating in Operational Demonstration Test (ODT). Procure new target vehicles to support Improved Top Attack development.			
<b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> FY 2022 funding decrease is due to the completion of XM204 qualification and operational testing efforts in FY 2022.			
<b>Accomplishments/Planned Programs Subtotals</b>	65.455	47.365	40.441

<b>C. Other Program Funding Summary (\$ in Millions)</b>											
<u>Line Item</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022</u> <u>Base</u>	<u>FY 2022</u> <u>OCO</u>	<u>FY 2022</u> <u>Total</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>FY 2026</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• E76740: Close Terrain Shaping Obstacle	-	4.995	34.761	-	34.761	-	-	-	-	-	-

**Remarks**

**D. Acquisition Strategy**  
In support of the Army's modernization priorities, the Army Acquisition Executive approved Terrain Shaping Obstacles (TSO) development using a series of incremental acquisition efforts to accelerate mature technology development and facilitate the fielding of lethal, non-persistent munitions to the Warfighter.

The XM204 system, the first CTSO funded by this project, is the interim solution utilizing the Urgent Capability Acquisition Framework in support of United States Army Europe Operational Needs Statement 18-22702. It is currently completing development and qualification in order to obtain Urgent Materiel Release. Afterwards, the XM204 system will transition to production to support FY 2023 Initial Operating Capability.

The follow-on CTSO increments, Top Attack and Bottom Attack, will provide advanced command and control and advanced lethality. The programs will leverage the Middle Tier of Acquisition (MTA) pathway to allow for rapid prototyping and rapid fielding of a complex obstacle solution with Army decision points to transition to a Program of Record. This project will also integrate full network capability into Top and Bottom Attack increments.

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army** **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603619A / Landmine Warfare and Barrier - Adv Dev	<b>Project (Number/Name)</b> EK7 / Area Denial Capability Development
--	--	--

<b>Management Services (\$ in Millions)</b>				<b>FY 2020</b>		<b>FY 2021</b>		<b>FY 2022 Base</b>		<b>FY 2022 OCO</b>		<b>FY 2022 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>			
Program Management	Various	PM Close Combat Systems : Picatinny Arsenal, NJ	3.428	0.374	Nov 2019	0.362	Mar 2021	0.362	Nov 2021	-		0.362	Continuing	Continuing	-
Scorpion Contract Closeout	MIPR	General Dynamics : Reston, VA	0.305	-		-		-		-		-	0.000	0.305	-
<b>Subtotal</b>			3.733	0.374		0.362		0.362		-		0.362	Continuing	Continuing	N/A

**Remarks**  
In FY 2022, funding in the amount of \$0.338 million for manpower that was realigned to Operations and Maintenance. Program support costs have been accurately updated to reflect the realignments.

<b>Product Development (\$ in Millions)</b>				<b>FY 2020</b>		<b>FY 2021</b>		<b>FY 2022 Base</b>		<b>FY 2022 OCO</b>		<b>FY 2022 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>			
Improved Top Attack (TA) Rapid Prototype Development	C/CPFF	TBD : TBD	-	-		-		19.248	Mar 2022	-		19.248	Continuing	Continuing	-
XM204 Capability Development	C/CPFF	Textron Defense Systems : Wilmington, MA	1.004	41.627	Mar 2020	32.195	Nov 2020	5.291	Dec 2021	-		5.291	0.000	80.117	-
TRAC/WSMR capability study	MIPR	White Sands Missile Range : White Sands, NM	-	0.525	May 2020	-		-		-		-	0.000	0.525	-
Common Secure Network Architecture	SS/FFP	Northrop Grumman Systems Corporation : Plymouth, MN	-	4.709	Apr 2020	-		-		-		-	0.000	4.709	-
Common Secure Network Architecture	SS/CPFF	Textron Defense Systems : Wilmington, MA	17.965	4.561	Jun 2020	-		-		-		-	0.000	22.526	-



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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army												Date: May 2021			
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)							
2040 / 4				PE 0603619A / Landmine Warfare and Barrier - Adv Dev				EK7 / Area Denial Capability Development							
Product Development (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Common Component Communications Study	SS/FFP	NAL Research Corporation : Manassas, Va	3.454	0.716	Aug 2020	-		-		-		-	0.000	4.170	-
High Powered Computer	C/FP	ACC New Jersey : Picatinny, NJ	-	0.247	Sep 2020	-		-		-		-	0.000	0.247	-
TSO Common Scene Generator	MIPR	DEVCOM Aviation And Missile Center : Redstone Arsenal, AL	-	0.350	Sep 2020	-		-		-		-	0.000	0.350	-
Top Attack Prototype Development A	SS/CPFF	Northrop Grumman Innovation Systems : Plymouth, MN	4.352	-		-		-		-		-	0.000	4.352	-
Top Attack Prototype Development B	SS/CPFF	Textron Defense Systems : Wilmington, MA	14.309	-		-		-		-		-	0.000	14.309	-
Technology Maturation Risk Reduction (TMRR) Development A	C/FFP	DEVCOM Armaments Center : Picatinny Arsenal, NJ	0.036	-		-		-		-		-	0.000	0.036	-
Technology Maturation Risk Reduction (TMRR) Development B	C/FFP	DEVCOM Armaments Center : Picatinny Arsenal, NJ	0.036	-		-		-		-		-	0.000	0.036	-
Secure Communications Network	SS/CPFF	Northrop Grumman Mission Systems : Redondo Beach, CA	16.976	-		-		-		-		-	0.000	16.976	-
User Evaluation Prototypes	C/FFP	DEVCOM Armaments Center : Picatinny Arsenal, NJ	0.214	-		-		-		-		-	0.000	0.214	-
<b>Subtotal</b>			58.346	52.735		32.195		24.539		-		24.539	Continuing	Continuing	N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army												Date: May 2021			
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)							
2040 / 4				PE 0603619A / Landmine Warfare and Barrier - Adv Dev				EK7 / Area Denial Capability Development							
Support (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
DEVCOM Armaments Center Engineering Support	MIPR	DEVCOM Armaments Center : Picatinny Arsenal, NJ	12.386	6.709	Dec 2020	6.684	Jan 2021	8.764	Oct 2021	-		8.764	Continuing	Continuing	-
DEVCOM C5ISR Center Engineering Support	MIPR	DEVCOM C5ISR NVESD Center : Fort Belvoir, VA	1.889	0.677	Jun 2020	0.401	Feb 2021	0.821	Jan 2022	-		0.821	Continuing	Continuing	-
Program Support	C/FFP	Bowhead : Picatinny Arsenal, NJ	0.556	0.577	May 2020	0.401	May 2021	0.636	May 2022	-		0.636	0.000	2.170	-
DEVCOM Army Research Laboratory Engineering Support	MIPR	DEVCOM Army Research Laboratory : Adelphi, MD	1.489	0.442	Jul 2020	0.301	Feb 2021	0.313	Jan 2022	-		0.313	Continuing	Continuing	-
Integrated Logistics Support	MIPR	TACOM ILSC : Warren, MI	0.156	-		0.056	May 2021	0.141	Jan 2022	-		0.141	0.000	0.353	-
Data Analysis Center	MIPR	DEVCOM-DAC : Aberdeen Proving Ground, MD	-	0.759	Aug 2020	1.476	Feb 2021	0.272	Jan 2022	-		0.272	0.000	2.507	-
Milestone Document Development Support	SS/FFP	Booz Allen Hamilton : Picatinny Arsenal, NJ	3.657	0.840	Jan 2020	1.079	Nov 2020	0.224	Feb 2022	-		0.224	0.514	6.314	-
Contractor Engineer Support	MIPR	American Systems INC : Chantilly, VA	-	0.074	Jun 2020	0.075	Nov 2020	0.076	Mar 2022	-		0.076	0.000	0.225	-
Mitre Engineering Support (C4)	FFRDC	Mitre : McLean, VA	0.634	0.839	Apr 2020	0.815	Aug 2021	1.193	Aug 2022	-		1.193	Continuing	Continuing	-
Tactical and Trainer TDP development	MIPR	SAVIT Corporation : Rockaway, NJ	-	0.156	Nov 2020	-		-		-		-	0.000	0.156	-
Fibertek, INC. Operational Contractor Support	C/CPFF	FIBERTEK, INC. : Herndon, VA	0.130	-		-		-		-		-	0.000	0.130	-
Program Support	C/FFP	Millennium Corporation : Picatinny Arsenal, NJ	0.411	-		-		-		-		-	0.000	0.411	-
Air Worthiness Certification	MIPR	AMRDEC : Redstone Arsenal, AL	0.010	-		-		-		-		-	0.000	0.010	-

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army												Date: May 2021			
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)							
2040 / 4				PE 0603619A / Landmine Warfare and Barrier - Adv Dev				EK7 / Area Denial Capability Development							
Support (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Polaris Contractor Support	C/FFP	MSCOE : Ft Leonard Wood - MO	0.024	-		-		-		-		-	0.000	0.024	-
<b>Subtotal</b>			21.342	11.073		11.288		12.440		-		12.440	Continuing	Continuing	N/A
Test and Evaluation (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Prototype Development Demonstration	MIPR	USAF 96th Test Squadron / OGEX : Eglin AFB, FL	-	-		-		1.000	Nov 2021	-		1.000	Continuing	Continuing	-
Procure Target Vehicles	MIPR	Target Management Office (TMO) : Huntsville, AL	-	-		0.453	Nov 2020	1.100	Nov 2021	-		1.100	0.000	1.553	-
Operational Demonstration Test	MIPR	Operational Test Command : Fort Hood, TX	-	-		-		1.000	Mar 2022	-		1.000	0.000	1.000	-
Test and Evaluation Support	MIPR	Yuma Test Center : Yuma, AZ	-	0.025	Apr 2020	2.619	Nov 2020	-		-		-	0.000	2.644	-
TSO Electromagnetic Environmental Effects E3 Test	MIPR	White Sands Missile Range : White Sands, NM	-	0.035	May 2020	0.255	May 2021	-		-		-	0.000	0.290	-
TSO E3 Test Support	MIPR	Redstone Test Center : Huntsville, AL	-	-		0.106	May 2021	-		-		-	0.000	0.106	-
Dynamic Flight Test and Ground Sensor Evaluation	MIPR	Aberdeen Test Center : Aberdeen, MD	-	0.400	Sep 2020	0.087	Dec 2020	-		-		-	0.000	0.487	-
XM204 Target Vehicle Refurbishment	MIPR	Yuma Proving Ground : Yuma Proving Ground, AZ	-	0.593	Jan 2020	-		-		-		-	0.000	0.593	-

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<b>Exhibit R-3, RDT&amp;E Project Cost Analysis: PB 2022 Army</b>												<b>Date: May 2021</b>			
<b>Appropriation/Budget Activity</b> 2040 / 4					<b>R-1 Program Element (Number/Name)</b> PE 0603619A / Landmine Warfare and Barrier - Adv Dev				<b>Project (Number/Name)</b> EK7 / Area Denial Capability Development						
<b>Test and Evaluation (\$ in Millions)</b>				<b>FY 2020</b>		<b>FY 2021</b>		<b>FY 2022 Base</b>		<b>FY 2022 OCO</b>		<b>FY 2022 Total</b>			
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
PAX2A type 1 for testing	MIPR	BAE SYSTEMS Ordnance Systems Inc : Kingsport, TN	-	0.220	Nov 2020	-		-		-		-	0.000	0.220	-
<b>Subtotal</b>			-	1.273		3.520		3.100		-		3.100	Continuing	Continuing	N/A
			<b>Prior Years</b>	<b>FY 2020</b>		<b>FY 2021</b>		<b>FY 2022 Base</b>		<b>FY 2022 OCO</b>		<b>FY 2022 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Project Cost Totals</b>			83.421	65.455		47.365		40.441		-		40.441	Continuing	Continuing	N/A
<b>Remarks</b>															

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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2022 Army</b>		<b>Date: May 2021</b>
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603619A / Landmine Warfare and Barrier - Adv Dev	<b>Project (Number/Name)</b> EK7 / Area Denial Capability Development

Event Name	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
<b>XM204 Interim Top Attack Capability</b>																												
XM204 System Development	[Redacted]																											
XM204 Prototype Testing	[Redacted]																											
XM204 SubSystem Integreation Testing	[Redacted]																											
XM204 Preliminary Design Review	1 Preliminary Design Review																											
XM204 Critical Design Review	2 Critical Design Review																											
XM204 Government Qualification Testing	[Redacted]																											
XM204 Manufacturing Development	[Redacted]																											
XM204 Production and Deployment Decision	3 Production and Deployment Decision																											
XM204 Operational Demonstration Test	4 Operational Demonstration Test																											
XM204 Production	[Redacted]																											
XM204 Urgent Material Release	6 Urgent Material Release																											
XM204 Initial Operational Capability	8 Initial Operational Capability																											




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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2022 Army</b>		<b>Date: May 2021</b>
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603619A / Landmine Warfare and Barrier - Adv Dev	<b>Project (Number/Name)</b> EK7 / Area Denial Capability Development

Event Name	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026				
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	
<b>TSO Future Capability Evaluation</b>																													
TSO Development of Alternative Methods of Defeat	[Redacted]				[Redacted]																								
<b>Increment 1 Improved Top Attack Capability Development</b>																													
INC 1 Top Attack Rapid Prototype Decision									5 ▲ Rapid Prototype Decision																				
INC 1 Top Attack Rapid Prototype Phase									[Redacted]																				
INC 1 Top Attack User Jury 1													7 ▲ User Jury 2																
INC 1 Top Attack User Jury 2																	9 ▲ User Jury 3												
INC 1 Top Attack Qualification Testing																	[Redacted]												
INC 1 Top Attack Rapid Fielding Decision																					11 ▲ Rapid Fielding Decision								
INC 1 Top Attack Rapid Fielding Phase																					[Redacted]								
<b>Bottom Attack Capability</b>																													
Bottom Attack Rapid Prototype Decision																									10 ▲ Bottom Attack Rapid Prototype Decision				
Bottom Attack Rapid Prototype Phase																					[Redacted]								

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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2022 Army</b>		<b>Date: May 2021</b>
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603619A / Landmine Warfare and Barrier - Adv Dev	<b>Project (Number/Name)</b> EK7 / Area Denial Capability Development

Event Name	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Bottom Attack User Jury 1																									 Bottom Attack User J			
Full Network Capability																									 Full Network Rapid Prot			
Full Network Rapid Prototype Decision																									 Full Network			
Full Network Prototype Phase																												

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603619A / <i>Landmine Warfare and Barrier - Adv Dev</i>	<b>Project (Number/Name)</b> EK7 / <i>Area Denial Capability Development</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
XM204 Interim Top Attack Capability	2	2025	2	2025
XM204 Materiel Development Decision	4	2015	4	2015
XM204 Model and Simulation Development	1	2016	4	2018
XM204 Concept Prototype Agreements Award(s)	2	2016	2	2016
XM204 Concept Prototype Build	2	2016	4	2016
XM204 Concept Prototype Test and Evaluation	1	2017	1	2017
XM204 Analysis of Alternatives	1	2016	4	2016
XM204 Materiel Solution Analysis	1	2017	3	2019
XM204 Munitions Delivery System Analysis	4	2018	4	2019
XM204 Development Decision	3	2019	3	2019
XM204 Capability Development Award	4	2019	4	2019
XM204 User Jury	4	2019	4	2019
XM204 System Development	4	2019	2	2022
XM204 Prototype Testing	1	2020	2	2020
XM204 SubSystem Integreation Testing	2	2020	2	2021
XM204 Preliminary Design Review	3	2020	3	2020
XM204 Critical Design Review	2	2021	2	2021
XM204 Government Qualification Testing	2	2021	2	2022
XM204 Manufacturing Development	4	2021	1	2023
XM204 Production and Deployment Decision	1	2022	1	2022
XM204 Operational Demonstration Test	2	2022	2	2022
XM204 Production	2	2022	2	2025



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**Exhibit R-4A, RDT&E Schedule Details:** PB 2022 Army **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603619A / Landmine Warfare and Barrier - Adv Dev	<b>Project (Number/Name)</b> EK7 / Area Denial Capability Development
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Events	Start		End	
	Quarter	Year	Quarter	Year
XM204 Urgent Material Release	3	2022	3	2022
XM204 Initial Operational Capability	4	2023	4	2023
TSO Future Capability Evaluation	2	2020	4	2021
TSO Development of Alternative Methods of Defeat	2	2020	4	2021
Increment 1 Improved Top Attack Capability Development	2	2022	3	2032
INC 1 Top Attack Rapid Prototype Decision	2	2022	2	2022
INC 1 Top Attack Rapid Prototype Phase	3	2022	2	2025
INC 1 Top Attack User Jury 1	3	2023	3	2023
INC 1 Top Attack User Jury 2	3	2024	3	2024
INC 1 Top Attack Qualification Testing	3	2024	3	2025
INC 1 Top Attack Rapid Fielding Decision	3	2025	3	2025
INC 1 Top Attack Rapid Fielding Phase	3	2025	3	2030
Bottom Attack Capability	2	2025	2	2033
Bottom Attack Rapid Prototype Decision	2	2025	2	2025
Bottom Attack Rapid Prototype Phase	3	2025	3	2028
Bottom Attack User Jury 1	2	2026	2	2026
Bottom Attack User Jury 2	2	2027	2	2027
Full Network Capability	3	2026	3	2028
Full Network Rapid Prototype Decision	2	2026	2	2026
Full Network Prototype Phase	3	2026	3	2028
Full Network User Jury 1	3	2027	3	2027
Full Network User Jury 2	3	2028	3	2028

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**Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Army** **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040: Research, Development, Test & Evaluation, Army / BA 4: Advanced Component Development & Prototypes (ACD&P)	<b>R-1 Program Element (Number/Name)</b> PE 0603639A / Tank and Medium Caliber Ammunition
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	-	72.456	100.367	79.873	-	79.873	-	-	-	-	-	-
694: Medium Caliber Ammunition	-	-	12.000	-	-	-	-	-	-	-	-	-
BQ4: 155mm Artillery Propulsion XM654	-	6.904	15.131	-	-	-	-	-	-	-	-	-
CD8: Long Range Precision Munition (LRPM)	-	-	-	29.198	-	29.198	-	-	-	-	-	-
EB8: OWL for Small Caliber Ammunition	-	1.918	-	-	-	-	-	-	-	-	-	-
EB9: Aviation Airborne Expendable Countermeasures	-	3.055	4.332	5.529	-	5.529	-	-	-	-	-	-
EC2: Adv Armor-Piercing (ADVAP) for Small Cal Ammo	-	8.572	-	-	-	-	-	-	-	-	-	-
EC3: Ammunition Logistics Prototyping	-	1.462	1.650	2.141	-	2.141	-	-	-	-	-	-
FA5: Assured Precision Weapons and Munitions	-	29.981	28.788	43.005	-	43.005	-	-	-	-	-	-
FG1: Cannon-Delivered Area Effects Munitions (C-DAEM)	-	20.564	38.466	-	-	-	-	-	-	-	-	-

**Note**  
 In Fiscal Year (FY) 2022, Project BQ4, 155mm Artillery Propulsion, will transition to Budget Activity 5, Program Element (PE) 0604802A, Weapons and Munitions Engineering Development, Project BQ3, 155mm Artillery Propulsion.  
 Project FG1, Cannon-Delivered Area Effects Munitions (C-DAEM), will transition to Budget Activity 5, PE 0604802A, Weapons and Munitions Engineering Development, Project FJ4, Cannon-Delivered Area Effects Munitions (C-DAEM).  
 Project CD8 / Long Range Precision Munition (LRPM) is a New Start.  
 Project 694 / Medium Caliber Ammunition has no funding request for FY 2022.

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2022 Army	<b>Date:</b> May 2021
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<b>Appropriation/Budget Activity</b> 2040: <i>Research, Development, Test &amp; Evaluation, Army / BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0603639A / <i>Tank and Medium Caliber Ammunition</i>
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**A. Mission Description and Budget Item Justification**

The Tank and Medium Caliber Ammunition Program Element encompasses a comprehensive program to develop, rapidly transition to production, and field advanced weapons and munitions for small, medium and large caliber munitions, tank ammunition, mortar ammunition, cannon artillery ammunition, and close combat system items. These Projects will ensure continued battlefield overmatch and lethality of United States maneuver forces against the full range of modern battlefield threats. To achieve this, Tank and Medium Caliber Ammunition projects will identify and develop promising technologies through competitive development and streamlined acquisition procedures.

Project 694 Medium Caliber Ammunition: Medium Caliber Ammunition supports development of Multi-Mode Proximity-Fuzed 30 millimeter (mm) munition capable of defeating materiel, personnel, and Unmanned Aerial Systems (UAS) threats. This capability supports the Initial Maneuver Short Range Air Defense (IM-SHORAD) directed requirement and is endorsed by the Air and Missile Defense Cross-Functional Team (AMD CFT). This effort will miniaturize and mature critical technologies in preparation to enter Engineering & Manufacturing Development (EMD). Critical technologies include proximity airburst fuzing, guidance and navigation, communication with fire control, and advanced lethality. There is no FY 2022 funding request.

Project BQ4 155mm Artillery Propulsion: Supercharge is a stand-alone top-zone 155 millimeter (mm) propelling charge required to achieve maximum range requirements from the XM1299 Increment 1C and XM1299A1 Increment 2 Extended Range Cannon Artillery (ERCA) Self-Propelled Howitzer (SPH). It will achieve lethality overmatch out to 70 kilometers (km) with developmental extended range projectiles, and will potentially increase range with compatible legacy projectiles up to thirty percent. Supercharge is composed of an earlier bag variant and later combustible cartridge case (foamed celluloid or felted fiber technology), integral metal Stub Case, electrically initiated primer, and advanced artillery propellant. There is no FY 2022 budget request. In FY 2022, this project transitions to Budget Activity 05; Program Element (PE) 0604802A, Weapons and Munitions - Engineering Development, Project BQ4, 155mm Artillery Propulsion.

Project CD8 - Army Aviation long range munition dominance and asymmetric advantage has eroded in recent years with peer adversaries expanding their capabilities by developing and fielding advanced systems designed to create physical stand-off especially in the realm of Anti-Access Area Denial (A2AD) and Integrated Air Defense Systems (IADS). Having operated in relatively uncontested environments for a number of years, the Joint Force has not kept pace with these peer and near peer developments and U.S. dominance is no longer assured. Army Aviation requires a Long Range Precision Munition (LRPM) that is integrated with the firing platform that can provide leap ahead capability in the penetration and dis-integration phases of Joint All Domain Operations (JADO). LRPM will provide Army Aviation with an improved long range munition system that can rapidly respond in a combat environment in order to improve the survivability of the warfighters and weapon systems, including aviation platforms in an A2AD and positioning, navigation, and timing (PNT) denied environment. The ability to interoperate and coordinate with other weapon systems and munitions at long ranges and adapt to changing threats is a core concept of the Army Aviation Weapons, Sub-Systems, and Munitions Initial Capabilities Document validated in June 2018. LRPM will leverage a modular open system architecture to facilitate a reduction of costs and rapid development as threats continue to evolve.

Project EB8 OWL for Small Caliber: The OWL project is a critical technology development in response to the 7.62 millimeter (mm) and 5.56mm Families of Ammunition Capabilities Development Documents (CDD) and .50 caliber munitions CDD. Current small caliber ammunition tracer rounds are a pyrotechnic tracer mix which allows enemy forces to see the trace round and track its trajectory back to the shooter. The OWL project's objective is to develop and field a full tracer round to replace the current pyrotechnic cartridges with trace cartridges that are only visible to the shooter and soldiers in close proximity, increasing soldier survivability, and increasing

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040: <i>Research, Development, Test &amp; Evaluation, Army I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0603639A / <i>Tank and Medium Caliber Ammunition</i>	
<p>lethality by incorporating Enhanced Performance Round (EPR) technology into the new tracer ammunition. 7.62mm and 5.56mm are the immediate focus followed by a similar development strategy for .50 caliber cartridges. There is no Fiscal Year (FY) 2022 funding request.</p> <p>Project EB9 Project EB9 Aviation Airborne Expendable Countermeasure (AAECM) supports the advanced development activities and technology demonstrations of the AAECM to include the XM215 Flare and XM20 Radio Frequency (RF) expendables. These expendable countermeasures systems are essential parts for Army aircraft and will be employed with currently fielded countermeasures as a cocktail to provide protection against all threats. Army Research Development Technology &amp; Evaluation (RDT&amp;E) efforts are coordinated with Program Executive Office (PEO) Aviation to address the AAECM capability, a critical Aircraft Survivability Equipment (ASE) enabler for enduring aircraft and the Future Vertical Lift (FVL) Cross Functional Team (CFT) within the Army's top modernization priorities.</p> <p>These advanced decoys will address deficiencies in Army aircraft protection and the safety of its aircrews against advanced Man-Portable Air Defense Systems (MANPADS) and shoulder launched Surface-to-Air Missiles (SAM) systems. This program will evaluate integrated technologies and countermeasure prototype systems in realistic operating test environments. Prototypes will demonstrate component and subsystem maturity prior to integration into major Army aircraft platforms. FY 2022 supports final developmental and initial operational testing for the XM20 RF Countermeasures (CM) ahead of the planned Milestone C in FY 2022.</p> <p>Project EC2 ADVAP: The Advanced Armor-Piercing (ADVAP) project is a critical technology development in response to the 7.62 millimeter (mm) and 5.56mm Family of Ammunition Capabilities Development Documents (CDD) and the Soldier Lethality Cross Functional Team (SL CFT) Initial Capability Document (ICD) which outlines the requirements for new ammunition to support the rapid prototyping/development of the Next Generation Squad Weapons (NGSW) under the Middle Tier of Acquisition (MTA) authority for rapid prototyping/rapid fielding. New ADVAP ammunition is designed to provide overmatch capability to defeat advanced light armored threats within typical machine gun engagement ranges.</p> <p>The Next Generation Squad Weapons (NGSW) ammunition is split into two initial variants, the General Purpose (GP) and the Special Purpose (SP). The nomenclature for the GP ammunition is XM1186 and the nomenclature for the SP ammunition is XM1184. The overall objective of the ADVAP project is to develop and Full Materiel Release (FMR) ammunition to defeat hard targets. There is no Fiscal Year (FY) 2022 funding request.</p> <p>Project EC3 Ammunition Logistics Prototyping: This Project supports the future force by improving the distribution, management, reliability and survivability of ammunition through the advanced development, integration, and demonstration of logistics system enablers. These enablers will improve the efficiency and effectiveness of ammunition operations, to include retrograde, while reducing the logistics footprint on the battlefield. Technology areas addressed include handling, distribution, and management (strategic and tactical), prognostics, diagnostics, and asset visibility, explosives safety, and adaptive and environmentally friendly packaging and palletization. The efficient deployment and sustainment of reliable ammunition is vital to success on the battlefield. This Project enhances the operational effectiveness of the ammunition logistics system to ensure the distribution of reliable ammunition to the warfighter. Fiscal Year (FY) 2022 funding will be used to further mature munition health monitoring devices in accordance with the needs of the relevant PMs. However, the preponderance of the funding will be used to directly to support Long Range Precision Fire (LRPF) munition health monitoring requirements throughout its resupply process. Specifically, the funding will be used to address munition health monitoring and packaging/preservation of munitions within the tactical movement of large caliber ammunition.</p>		

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2022 Army	<b>Date:</b> May 2021
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<b>Appropriation/Budget Activity</b> 2040: <i>Research, Development, Test &amp; Evaluation, Army / BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0603639A / <i>Tank and Medium Caliber Ammunition</i>
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Project FA5 Assured Precision Weapons and Munitions (APWM): The APWM Project is focused on advanced risk mitigation, technology integration, prototyping, and product support to identify, evaluate, mature, test, and demonstrate various assured precision prototype technologies in weapon and munitions components and subsystems within a complex system-of-systems (SoS) environment. The APWM Project reinforces the National Defense Strategy's major lines of effort through technology development and prototyping, which increases lethality and ensures future combat overmatch success of the Joint Force against peer/near-peer adversaries. This project also aims to improve program performance and affordability for multiple weapons and munitions Programs of Record (PoRs) via Joint Lethality Positioning, Navigation and Timing (PNT) and Army M-Code Global Positioning System (GPS) coordinated efforts. The APWM Project directly supports top Army Modernization Priorities via the Assured-PNT (A-PNT) and Long Range Precision Fires (LRPF) Cross Functional Team (CFT) imperatives in support of the National Defense Strategy. Funding will support engagement by weapons and munitions PNT experts in the development, evaluation, and technology delivery activities of the Air Force's M-Code GPS, Army's PNT related programs, and A-PNT/Space CFT programs in support of LRPF and Counter Anti-Access/Area Denial (A2/AD) missions. Funding will also enable component and subsystem architecture input essential for Precision Weapons and Munitions (PW&M) operating in a Navigation Warfare (NavWar) SoS environment, Army M-Code GPS technology integration and evaluation, planning and evaluating next generation M-Code GPS to validate capability for future Joint precision munitions, and maturation of alternative PNT and NavWar related technologies and solutions to enable informed A-PNT related PoR milestone and Army cross-functional modernization decisions.

Project FG1 Cannon-Delivered Area Effects Munitions (C-DAEM) Project will provide United States (U.S). ground forces with the capability to engage area personnel through armored targets, while denying threat forces full operational freedom within the targeted area. An Analysis of Alternatives (AoA) was completed in January 2018 to inform Army acquisition and investment decisions regarding replacement of the current stockpile of 155 millimeter (mm) Dual Purpose Improved Conventional Munitions (DPICM) with Department of Defense (DoD) policy compliant munitions and address anti-armor and extended range capability requirements. The Army validated two materiel solutions for C-DAEM to be pursued in parallel. C-DAEM Armor (Increment 1) will destroy moved and moving infantry fighting vehicles, self-propelled howitzers, and tanks. C-DAEM DPICM Replacement (Increment 2) will destroy personnel to light-skinned vehicles. There is no FY 2022 budget request.

<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022 Base</b>	<b>FY 2022 OCO</b>	<b>FY 2022 Total</b>
Previous President's Budget	77.696	92.753	39.193	-	39.193
Current President's Budget	72.456	100.367	79.873	-	79.873
Total Adjustments	-5.240	7.614	40.680	-	40.680
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-1.000			
• Congressional Rescissions	-	-			
• Congressional Adds	-	12.000			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-2.044	-			
• SBIR/STTR Transfer	-3.196	-3.386			
• Adjustments to Budget Years	-	-	40.680	-	40.680

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2022 Army	<b>Date:</b> May 2021
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<b>Appropriation/Budget Activity</b> 2040: <i>Research, Development, Test &amp; Evaluation, Army / BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0603639A / <i>Tank and Medium Caliber Ammunition</i>
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**Congressional Add Details (\$ in Millions, and Includes General Reductions)**

**Project:** 694: *Medium Caliber Ammunition*

Congressional Add: *Development of Guided / Proximity Airburst Munition*

Congressional Add Subtotals for Project: 694

Congressional Add Totals for all Projects

	FY 2020	FY 2021
	-	12.000
	-	12.000
	-	12.000

**Change Summary Explanation**

FY 2022 Program Element (PE) 0603639A Tank and Medium Caliber Ammunition is a mix of decreases and increases. There are slight increases on EB9 and EC3 and a large increase on FA5 for the PGM Software-Defined Receiver (SDRx). Overall the decrease is largely due to BQ4 transitioning to BA5 BQ3 155mm Artillery Propulsion.

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**Exhibit R-2A, RDT&E Project Justification:** PB 2022 Army **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603639A / Tank and Medium Caliber Ammunition	<b>Project (Number/Name)</b> 694 / Medium Caliber Ammunition
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
694: Medium Caliber Ammunition	-	-	12.000	-	-	-	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

**Note**

There is no Fiscal Year (FY) 2022 funding request.

**A. Mission Description and Budget Item Justification**

Project 694 Medium Caliber Ammunition supports development of Multi-Mode Proximity-Fuzed 30 millimeter (mm) munition capable of defeating materiel, personnel, and Unmanned Aerial Systems (UAS) threats. This capability supports the Initial Maneuver Short Range Air Defense (IM-SHORAD) directed requirement and is endorsed by the Air and Missile Defense Cross-Functional Team (AMD CFT). This effort will miniaturize and mature critical technologies in preparation to enter Engineering & Manufacturing Development (EMD). Critical technologies include proximity airburst fuzing, guidance and navigation, communication with fire control, and advanced lethality.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	FY 2020	FY 2021
<b>Congressional Add:</b> Development of Guided / Proximity Airburst Munition	-	12.000
<b>FY 2021 Plans:</b> Design, development, and maturation critical technologies that will conclude with a prototype demonstration.		
<b>Congressional Adds Subtotals</b>	-	12.000

**C. Other Program Funding Summary (\$ in Millions)**

N/A

**Remarks**

**D. Acquisition Strategy**

Other Transaction Agreement (OTA) contracts will be utilized for development, maturation and prototyping of critical fuzing and guidance technologies.

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army** **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603639A / Tank and Medium Caliber Ammunition	<b>Project (Number/Name)</b> 694 / Medium Caliber Ammunition
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<b>Product Development (\$ in Millions)</b>				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Engineering and Prototype Hardware	C/CPFF	Northrop Grumman Innovation Systems (NGIS) : Plymouth, MN	-	-		9.800	Mar 2021	-		-		-	0.000	9.800	-
<b>Subtotal</b>			-	-		9.800		-		-		-	0.000	9.800	N/A

<b>Support (\$ in Millions)</b>				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Combat Capabilities Development Command Armaments Center (CCDC AC)	MIPR	Combat Capabilities Development Command Armaments Center (CCDC AC) : Picatinny, NJ	-	-		2.000	Mar 2021	-		-		-	0.000	2.000	-
<b>Subtotal</b>			-	-		2.000		-		-		-	0.000	2.000	N/A

<b>Test and Evaluation (\$ in Millions)</b>				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Aberdeen Test Center	MIPR	Aberdeen Proving Ground : Aberdeen, MD	-	-		0.200	Jun 2021	-		-		-	0.000	0.200	-
<b>Subtotal</b>			-	-		0.200		-		-		-	0.000	0.200	N/A

			Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
<b>Project Cost Totals</b>			-	-	12.000	-	-	-	0.000	12.000	N/A

**Remarks**



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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2022 Army</b>		<b>Date: May 2021</b>
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603639A / <i>Tank and Medium Caliber Ammunition</i>	<b>Project (Number/Name)</b> 694 / <i>Medium Caliber Ammunition</i>

Event Name	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Technology Maturation and Risk Reduction (TMRR)					[Redacted]																							
Engineering & Prototype Hardware Award					1																							
Ammo Design Engineering Test 1 (DET)					Eng & Prototype Hdwr Award																							
Ammo Design Engineering Test 2 (DET)					DET 1 Test																							
									DET 2 Test																			

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603639A / <i>Tank and Medium Caliber Ammunition</i>	<b>Project (Number/Name)</b> 694 / <i>Medium Caliber Ammunition</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Technology Maturation and Risk Reduction (TMRR)	2	2021	2	2022
Engineering & Prototype Hardware Award	2	2021	2	2021
Ammo Design Engineering Test 1 (DET)	4	2021	1	2022
Ammo Design Engineering Test 2 (DET)	3	2022	4	2022

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**Exhibit R-2A, RDT&E Project Justification:** PB 2022 Army **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4					<b>R-1 Program Element (Number/Name)</b> PE 0603639A / Tank and Medium Caliber Ammunition				<b>Project (Number/Name)</b> BQ4 / 155mm Artillery Propulsion XM654			
COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
BQ4: 155mm Artillery Propulsion XM654	-	6.904	15.131	-	-	-	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**Note**

In Fiscal Year (FY) 2022, Project BQ4, 155mm Artillery Propulsion, will transition to Budget Activity 5, Program Element (PE) 0604802A, Weapons and Munitions Engineering Development, Project BQ3, 155mm Artillery Propulsion. There is no FY 2022 request for Project BQ4.

**A. Mission Description and Budget Item Justification**

Supercharge is a stand-alone top-zone 155 millimeter (mm) propelling charge required to achieve maximum range requirements from the XM1299A1 Extended Range Cannon Artillery (ERCA) Self-Propelled Howitzer (SPH). It will achieve lethality overmatch out to 70 kilometers (km) with developmental extended range projectiles, and will increase range with legacy projectiles by thirty percent. Supercharge is composed of combustible cartridge case (foamed celluloid or felted fiber technology), integral metal Stub Case, electrically initiated primer, and advanced artillery propellant. There is no FY 2022 budget request.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	FY 2020	FY 2021	FY 2022
<b>Title:</b> 155mm Artillery Propulsion Supercharge	6.904	15.131	-
<b>Description:</b> Unitary top-zone propelling charge for XM907E2 Extended Range Cannon with Slide-block breech for use with ERCA Increased Range (formerly Increments 1C) and ERCA Increased Rate of Fire (formerly Increment 2) to gain range overmatch for 155mm artillery.			
<b>FY 2021 Plans:</b> FY 2021 funding will continue the support of concurrent design risk reduction and prototype maturation efforts for two Supercharge variants (2-piece bag and cased) to support the acceleration of ERCA Increased Range (formerly Increment 1C) and ERCA Increased Rate of Fire (formerly Increment 2) with automated loading system.			
<b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> FY 2022 decrease in funding due to Project BQ4 transition to Budget Activity 5, Project BQ3, 155mm Artillery Propulsion.			
<b>Accomplishments/Planned Programs Subtotals</b>	6.904	15.131	-

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603639A / <i>Tank and Medium Caliber Ammunition</i>	<b>Project (Number/Name)</b> BQ4 / <i>155mm Artillery Propulsion XM654</i>

**C. Other Program Funding Summary (\$ in Millions)**

<u>Line Item</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2022</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>FY 2026</u>	<u>Cost To</u>	
			<u>Base</u>	<u>OCO</u>	<u>Total</u>					<u>Complete</u>	<u>Total Cost</u>
• BQ3: <i>155mm Artillery Propulsion XM654</i>	-	-	34.461	-	34.461	-	-	-	-	-	-

**Remarks**

In FY 2022, this Project will transition to Budget Activity 05, Program Element (PE) 0604802A Weapons and Munitions - Eng Dev Project BQ3 155mm Artillery Propulsion XM654. A Procurement of Ammunition, Army (PAA) funding line, Standard Study Number E99350, was established for transition to procurement FY 2022.

**D. Acquisition Strategy**

The Supercharge Project will consist of critical technology prototyping, testing, and demonstration of two variants: (1) the Supercharge 2-piece Bag configuration to support the acceleration of the Extended Range Cannon Artillery (ERCA) Increased Range to achieve lethality at 70km and greater with precision accuracy by FY 2023, and (2) the Supercharge Cased to support ERCA Increased Rate of Fire (IRF) with added automated loading system at a date to be determined. The Project will utilize the Defense Ordnance Technology Consortium (DOTC) Other Transaction Agreement (OTA) for the integration of components such as propellant, combustible case, igniter and stub case.

In FY 2022, the Supercharge 2-piece Bag will complete qualification testing and transition to procurement of Safety Release quantities for First Unit Issued (FUI) of ERCA Increased Range in FY 2023 to support Operational Assessment during FY 2024. Federal Acquisition Regulation (FAR) based production contract(s) will be awarded for Urgent Materiel Release (UMR) and Full Materiel Release (FMR).

The Cased Supercharge will require additional technology maturation, system integration, developmental testing and qualification for UMR to support ERCA IRF. FAR based production contract(s) will be awarded for FMR.

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army** **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603639A / Tank and Medium Caliber Ammunition	<b>Project (Number/Name)</b> BQ4 / 155mm Artillery Propulsion XM654
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<b>Management Services (\$ in Millions)</b>				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Program Management	Various	Office of the Project Manager (PM) Combat Ammunition Systems (CAS) : Picatinny Arsenal, NJ	-	0.053	Jan 2020	0.050	Oct 2020	-		-		-	0.000	0.103	-
<b>Subtotal</b>			-	0.053		0.050		-		-		-	0.000	0.103	N/A

**Remarks**  
Program Management reflects Supercharge travel and milestone documentation support.

<b>Product Development (\$ in Millions)</b>				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Supercharge Prototype Hardware	MIPR	DoD Ordnance Technology Consortium (DOTC) : TBD	-	4.106	May 2020	8.756	Nov 2020	-		-		-	0.000	12.862	-
Developmental Projectile/ Fuze Hardware	MIPR	DoD Ordnance Technology Consortium (DOTC) : TBD	-	-		1.100	Nov 2020	-		-		-	0.000	1.100	-
<b>Subtotal</b>			-	4.106		9.856		-		-		-	0.000	13.962	N/A

**Remarks**  
FY 2021 increase to support prototype maturation of two Supercharge variants to support Army modernization requirements to achieve lethality at 70 kilometers (km) with precision accuracy by FY 2023.

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army** **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603639A / Tank and Medium Caliber Ammunition	<b>Project (Number/Name)</b> BQ4 / 155mm Artillery Propulsion XM654
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<b>Support (\$ in Millions)</b>				<b>FY 2020</b>		<b>FY 2021</b>		<b>FY 2022 Base</b>		<b>FY 2022 OCO</b>		<b>FY 2022 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>			
Engineering Support	MIPR	Combat Capabilities Development Command Armaments Center (CCDC AC) : Picatinny Arsenal, NJ	-	1.528	Jan 2020	2.125	Nov 2020	-		-		-	0.000	3.653	-
<b>Subtotal</b>			-	1.528		2.125		-		-		-	0.000	3.653	N/A

**Remarks**  
Engineering support required for ongoing design risk reduction and prototype maturation efforts of two Supercharge variants.

<b>Test and Evaluation (\$ in Millions)</b>				<b>FY 2020</b>		<b>FY 2021</b>		<b>FY 2022 Base</b>		<b>FY 2022 OCO</b>		<b>FY 2022 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>			
Supercharge Prototype Testing	MIPR	Army Test & Evaluation Command (ATEC) : Yuma, AZ	-	1.217	Mar 2020	3.100	Feb 2021	-		-		-	0.000	4.317	-
<b>Subtotal</b>			-	1.217		3.100		-		-		-	0.000	4.317	N/A

**Remarks**  
Additional FY 2021 testing activities required for ongoing design risk reduction and prototype maturation efforts of two Supercharge variants.

<b>Project Cost Totals</b>	<b>Prior Years</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022 Base</b>	<b>FY 2022 OCO</b>	<b>FY 2022 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
	-	6.904	15.131	-	-	-	0.000	22.035	N/A

**Remarks**

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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2022 Army</b>		<b>Date: May 2021</b>
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603639A / Tank and Medium Caliber Ammunition	<b>Project (Number/Name)</b> BQ4 / 155mm Artillery Propulsion XM654

Event Name	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026				
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	
<b>Supercharge 2-piece Bag (UMR Variant)</b>																													
Bag Preliminary Design Review (PDR)	▲ 1 PDR																												
Bag Prototype Development & Testing	Prototyping & Testing																												
Bag Critical Design Review (CDR)					▲ 2 CDR																								
Bag Qualification Testing									Qualification Testing																				
Bag Urgent Materiel Release (UMR)													▲ 4 UMR																
ERCA Increment 1C First Unit Issues (FUI)																	▲ 5 ERCA Inc 1C FUI												
<b>Supercharge Cased (FMR Variant)</b>																													
Cased PDR					▲ 3 PDR																								
Cased Prototype Development					Prototyping																								
Cased Developmental Testing									Developmental Testing																				
Cased Qualification Testing													Qualification Testing																

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<b>Exhibit R-4, RDT&amp;E Schedule Profile:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603639A / <i>Tank and Medium Caliber Ammunition</i>	<b>Project (Number/Name)</b> BQ4 / <i>155mm Artillery Propulsion XM654</i>

**Note**  
Schedule reflects design risk reduction and prototype maturation efforts for two parallel Supercharge variants (2-piece bag and cased) required to support the concurrent development of the Extended Range Cannon Artillery (ERCA) Increased Range (accelerated to achieve precision accuracy at 70km range by FY 2023) and ERCA Increased Rate of Fire (with added automated loading system).



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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603639A / <i>Tank and Medium Caliber Ammunition</i>	<b>Project (Number/Name)</b> BQ4 / <i>155mm Artillery Propulsion XM654</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Supercharge 2-piece Bag (UMR Variant)	1	2020	3	2022
Bag Preliminary Design Review (PDR)	2	2020	2	2020
Bag Prototype Development & Testing	2	2020	4	2021
Bag Critical Design Review (CDR)	4	2020	4	2020
Bag Qualification Testing	1	2022	3	2022
Bag Urgent Materiel Release (UMR)	3	2022	3	2022
ERCA Increment 1C First Unit Issues (FUI)	4	2023	4	2023
Supercharge Cased (FMR Variant)	1	2020	4	2025
Cased PDR	1	2021	1	2021
Cased Prototype Development	1	2021	4	2021
Cased Developmental Testing	1	2022	3	2022
Cased Qualification Testing	4	2022	4	2025

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**Exhibit R-2A, RDT&E Project Justification:** PB 2022 Army **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4					<b>R-1 Program Element (Number/Name)</b> PE 0603639A / Tank and Medium Caliber Ammunition				<b>Project (Number/Name)</b> CD8 / Long Range Precision Mmunition (LRPM)			
COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
CD8: Long Range Precision Mmunition (LRPM)	-	-	-	29.198	-	29.198	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**Note**

This is a new start in FY 2022.

Project CD8 / Long Range Precision Mmunition (LRPM) is a New Start for Fiscal Year (FY) 2022.

**A. Mission Description and Budget Item Justification**

Army Aviation long range munition dominance and asymmetric advantage has eroded in recent years with peer adversaries expanding their capabilities by developing and fielding advanced systems designed to create physical stand-off especially in the realm of Anti-Access Area Denial (A2AD) and Integrated Air Defense Systems (IADS). Having operated in relatively uncontested environments for a number of years, the Joint Force has not kept pace with these peer and near peer developments and U.S. dominance is no longer assured. Army Aviation requires a Long Range Precision Mmunition (LRPM) that is integrated with the firing platform that can provide leap ahead capability in the penetration and dis-integration phases of Joint All Domain Operations (JADO). LRPM will provide Army Aviation with an improved long range munition system that can rapidly respond in a combat environment in order to improve the survivability of the warfighters and weapon systems, including aviation platforms in an A2AD and positioning, navigation, and timing (PNT) denied environment. The ability to interoperate and coordinate with other weapon systems and munitions at long ranges and adapt to changing threats is a core concept of the Army Aviation Weapons, Sub-Systems, and Munitions Initial Capabilities Document validated in June 2018. LRPM will leverage a modular open system architecture to facilitate a reduction of costs and rapid development as threats continue to evolve.

**B. Accomplishments/Planned Programs (\$ in Millions)**

<b>Title:</b> Long Range Precision Mmunition	FY 2020	FY 2021		FY 2022
<b>Description:</b> This line funds the demonstration and validation of a munition system that will engage and render desired lethal effects on targets at ranges beyond line of sight using open system architecture. The LRPM development effort includes demonstration and validation of precision guided munitions with the capability to complete the assigned mission in environments that could include cyber-attack, countermeasures, counter precision guided munition systems and anti-access area denial environments. These efforts will include technical assessments, concept studies, perform risk reduction efforts, technology maturation, engineering design, engineering / manufacturing development, test, demonstration of prototype hardware, integration and document preparation for integration of the LRPM and associated contract efforts.	-	-		29.198
<b>FY 2022 Plans:</b> 1. Initiate technology maturation and risk reduction efforts including an Industry capabilities demonstration. 2. Evaluate industry concepts utilizing test scoring criteria and laboratory analysis.				

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army	<b>Date:</b> May 2021
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<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603639A / <i>Tank and Medium Caliber Ammunition</i>	<b>Project (Number/Name)</b> CD8 / <i>Long Range Precision Munition (LRPM)</i>
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<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	FY 2020	FY 2021	FY 2022
3. Prepare program acquisition and contract documentation.			
<b><i>FY 2021 to FY 2022 Increase/Decrease Statement:</i></b> New Start. Significant ramp in funding required to execute demonstration event and prepare for award of developmental contract.			
<b>Accomplishments/Planned Programs Subtotals</b>	-	-	29.198

**C. Other Program Funding Summary (\$ in Millions)**

N/A

**Remarks**

**D. Acquisition Strategy**

The LRPM Program will explore and leverage industry's ability to deliver an LRPM solution through a Shoot-Off capability demonstration. Selected vendors will deliver test assets in support of a United States Government Test in 4QTR FY 2022. This demonstration will illustrate their design concepts and technical approaches to inform the LRPM Capability Development Document (CDD). Following the LRPM Shoot-Off capability demonstration event, the Army will select one or more vendors for refinement, maturation, and qualification of the weapon system. A planned contract award in 4QTR FY 2023 will mature and qualify the LRPM system.

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army** **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603639A / Tank and Medium Caliber Ammunition	<b>Project (Number/Name)</b> CD8 / Long Range Precision Munition (LRPM)
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<b>Management Services (\$ in Millions)</b>				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Systems Engineering/ Program Management	MIPR	Various Performers : Various	-	-		-		2.560	Nov 2021	-		2.560	0.000	2.560	-
<b>Subtotal</b>			-	-		-		2.560		-		2.560	0.000	2.560	N/A

<b>Product Development (\$ in Millions)</b>				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
LRPM Other Government Agency	MIPR	CCDC Redstone Arsenal, AL : Various	-	-		-		3.410	Nov 2021	-		3.410	0.000	3.410	-
<b>Subtotal</b>			-	-		-		3.410		-		3.410	0.000	3.410	N/A

<b>Test and Evaluation (\$ in Millions)</b>				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Demonstration Testing	MIPR	To Be Determined : To Be Determined	-	-		-		17.732	Jan 2022	-		17.732	0.000	17.732	-
LRPM Other Government Agency	MIPR	Various Performers : Various	-	-		-		5.496	Nov 2021	-		5.496	0.000	5.496	-
<b>Subtotal</b>			-	-		-		23.228		-		23.228	0.000	23.228	N/A

	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract	
<b>Project Cost Totals</b>		-	-	0.000	29.198	-	29.198	0.000	29.198	N/A

**Remarks**

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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2022 Army</b>			<b>Date: May 2021</b>
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603639A / <i>Tank and Medium Caliber Ammunition</i>	<b>Project (Number/Name)</b> CD8 / <i>Long Range Precision Munition (LRPM)</i>	

Event Name	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026							
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4				
Technology Demonstration																																
Contract Preparation																																
Development Phase																																

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603639A / <i>Tank and Medium Caliber Ammunition</i>	<b>Project (Number/Name)</b> CD8 / <i>Long Range Precision Munition (LRPM)</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Technology Demonstration	1	2022	4	2022
Contract Preparation	1	2022	3	2023
Development Phase	4	2023	3	2028

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**Exhibit R-2A, RDT&E Project Justification:** PB 2022 Army **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4					<b>R-1 Program Element (Number/Name)</b> PE 0603639A / Tank and Medium Caliber Ammunition				<b>Project (Number/Name)</b> EB8 / OWL for Small Caliber Ammunition			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022 Base</b>	<b>FY 2022 OCO</b>	<b>FY 2022 Total</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>FY 2026</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
EB8: OWL for Small Caliber Ammunition	-	1.918	-	-	-	-	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

The OWL project is a critical technology development in response to the 7.62 millimeter (mm) and 5.56mm Families of Ammunition Capabilities Development Documents (CDD) and .50 caliber munitions CDD. Current small caliber ammunition tracer rounds are a pyrotechnic tracer mix which allows enemy forces to see the trace round and track its trajectory back to the shooter. The OWL project's objective is to develop and field a full tracer round to replace the current pyrotechnic cartridges with trace cartridges that are only visible to the shooter and soldiers in close proximity, increasing soldier survivability, and increasing lethality by incorporating Enhanced Performance Round (EPR) technology into the new tracer ammunition. 7.62mm and 5.56mm are the immediate focus followed by a similar development strategy for .50 caliber cartridges. There is no Fiscal Year (FY) 2022 funding request.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
<b>Title:</b> Technology Maturation and Risk Reduction (TMRR)	1.918	-	-
<b>Description:</b> OWL will develop and demonstrate a full tracer technology that eliminates the shortcomings of current legacy tracers.			
<b>Accomplishments/Planned Programs Subtotals</b>	1.918	-	-

**C. Other Program Funding Summary (\$ in Millions)**

<u>Line Item</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022 Base</u>	<u>FY 2022 OCO</u>	<u>FY 2022 Total</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>FY 2026</u>	<u>Cost To Complete</u>	<u>Total Cost</u>
• EP4: One-Way Luminescence for Small Caliber Ammo	8.195	13.467	6.896	-	6.896	-	-	-	-	-	-

**Remarks**

Project EB8 OWL for Small Caliber funding transitioned to BA 5 PE 0604802A Weapons and Munitions - Eng Dev Weapons and Munitions - Eng Dev Project EP4 OWL Small Caliber Ammo.

**D. Acquisition Strategy**

The OWL technology will be integrated into the M80A1 trace ammunition production. The OWL concept will be developed through Government and Industry prototyping efforts. Technology Readiness Assessments (TRAs) were conducted in FY 2017 and FY 2018 to evaluate the Industry and Government concepts in order to proceed

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**Exhibit R-2A, RDT&E Project Justification:** PB 2022 Army **Date:** May 2021

<b>Appropriation/Budget Activity</b>	<b>R-1 Program Element (Number/Name)</b>	<b>Project (Number/Name)</b>
2040 / 4	PE 0603639A / <i>Tank and Medium Caliber Ammunition</i>	EB8 / <i>OWL for Small Caliber Ammunition</i>

with the 7.62mm Engineering and Manufacturing Development (EMD) in FY 2019. The 5.56mm and .50 caliber cartridges will follow the 7.62mm schedule with EMD scheduled to commence in FY 2021 for the 5.56mm variant. The new 5.56mm tracer cartridges will replace the legacy 5.56mm M856A1 tracer.



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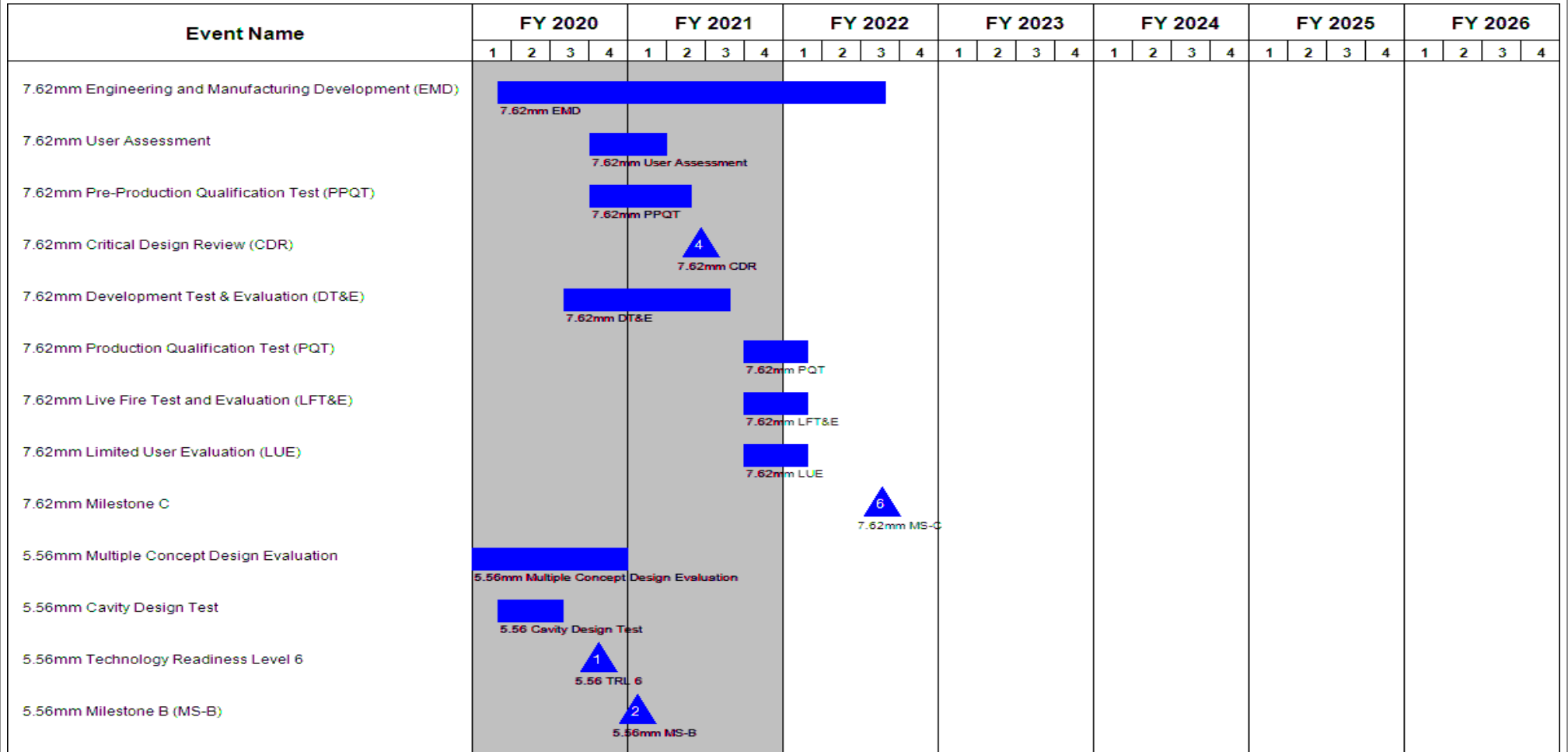
Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army												Date: May 2021			
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)							
2040 / 4				PE 0603639A / Tank and Medium Caliber Ammunition				EB8 / OWL for Small Caliber Ammunition							
Product Development (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Tooling Development	Option/CPFF	JAK Tool Engineering Solutions : Cranbury, NJ	0.780	0.886	Feb 2020	-		-		-		-	0.000	1.666	Continuing
Prototype Development Contract 1	Option/CPFF	General Dynamics : Florham Park, NJ	0.515	-		-		-		-		-	0.000	0.515	Continuing
Prototype Development Contract 2	Option/CPFF	Nammo Tally : Mesa, AZ	0.515	-		-		-		-		-	0.000	0.515	Continuing
<b>Subtotal</b>			1.810	0.886		-		-		-		-	0.000	2.696	N/A
Support (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Combat Capabilities Development Command Armaments Center (CCDC AC)	MIPR	Combat Capabilities Development Command Armaments Center (CCDC AC) : Picatinny, NJ	6.608	0.872	Oct 2019	-		-		-		-	2.498	9.978	Continuing
Development Support	Option/FFP	Leidos Inc. : Reston, VA	0.068	-		-		-		-		-	0.000	0.068	-
<b>Subtotal</b>			6.676	0.872		-		-		-		-	2.498	10.046	N/A
Test and Evaluation (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Army Research Lab (ARL)	MIPR	Army Research Lab (ARL) : Aberdeen, MD	0.278	0.100	Oct 2019	-		-		-		-	1.500	1.878	Continuing

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army													Date: May 2021			
Appropriation/Budget Activity					R-1 Program Element (Number/Name)					Project (Number/Name)						
2040 / 4					PE 0603639A / Tank and Medium Caliber Ammunition					EB8 / OWL for Small Caliber Ammunition						
Test and Evaluation (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total		Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost				
US Army Aberdeen Test Center (ATC)	MIPR	US Army Aberdeen Test Center (ATC) : Aberdeen, MD	0.101	0.060	Oct 2019	-		-		-		-	0.000	0.161	-	
Army Corps of Engineers	MIPR	Army Corps of Engineers : Vicksburg, MO	0.388	-		-		-		-		-	1.500	1.888	Continuing	
Army Joint Munitions Command	MIPR	Army Joint Munitions Command : Rock Island, IL	0.204	-		-		-		-		-	0.000	0.204	-	
Prototype testing	Option/FFP	Double B Enterprises : Malvern, IA	0.200	-		-		-		-		-	0.000	0.200	Continuing	
<b>Subtotal</b>			1.171	0.160		-		-		-		-	3.000	4.331	N/A	
<b>Project Cost Totals</b>			9.657	1.918		0.000		-		-		-	5.498	17.073	N/A	
<b>Remarks</b>																

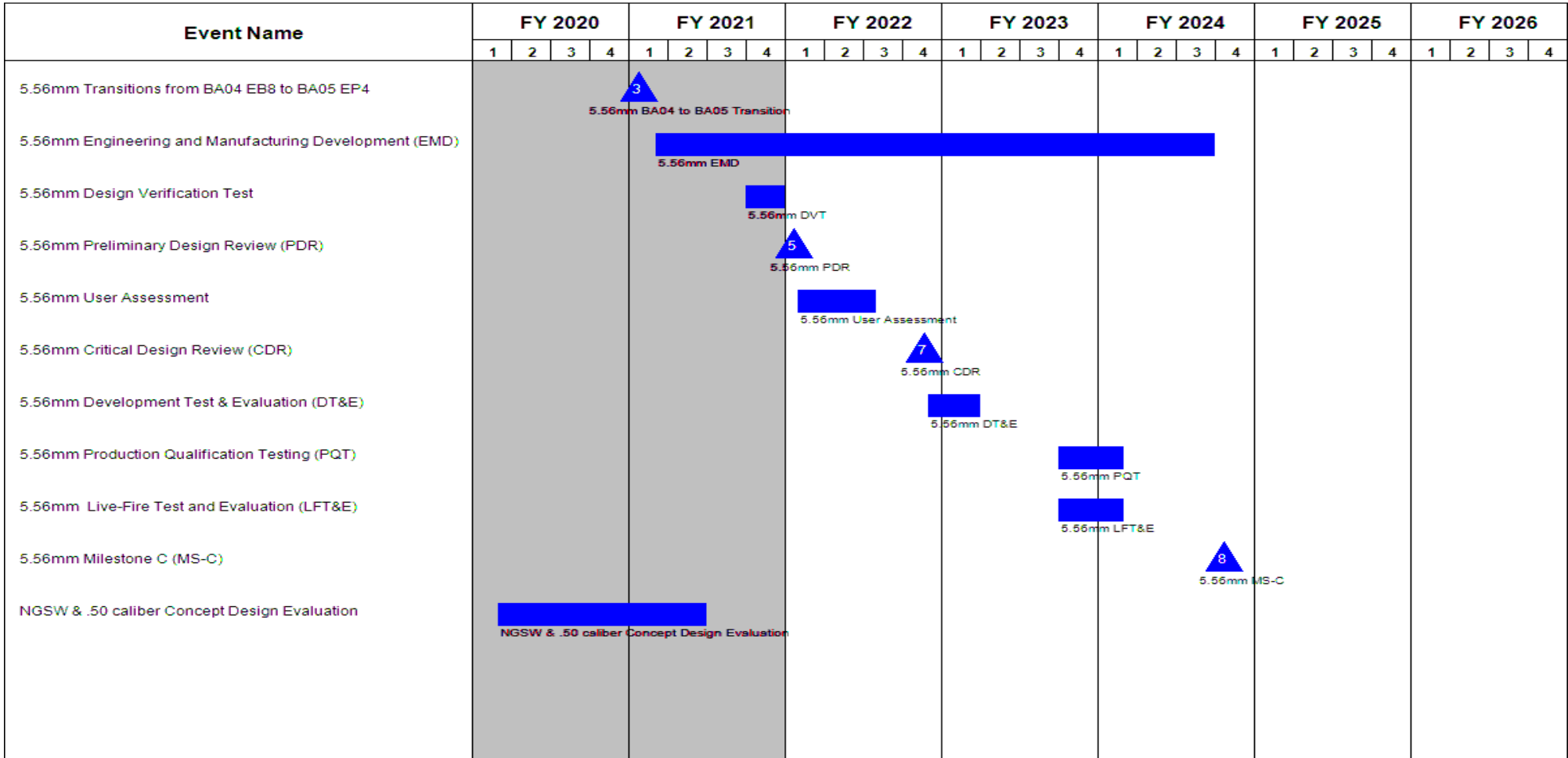
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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2022 Army</b>		<b>Date: May 2021</b>
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603639A / <i>Tank and Medium Caliber Ammunition</i>	<b>Project (Number/Name)</b> EB8 / <i>OWL for Small Caliber Ammunition</i>



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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2022 Army</b>		<b>Date: May 2021</b>
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603639A / Tank and Medium Caliber Ammunition	<b>Project (Number/Name)</b> EB8 / OWL for Small Caliber Ammunition



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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603639A / <i>Tank and Medium Caliber Ammunition</i>	<b>Project (Number/Name)</b> EB8 / <i>OWL for Small Caliber Ammunition</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
7.62mm Materiel Development Decision (MDD)	4	2016	4	2016
7.62mm Multiple Concept Design Evaluation	1	2015	1	2019
7.62mm Milestone B (MS-B)	1	2019	1	2019
7.62mm Transitions from BA04 EB8 to BA05 EP4	1	2019	1	2019
7.62mm Engineering and Manufacturing Development (EMD)	1	2019	3	2022
7.62mm Design Verification Test	2	2019	3	2019
7.62mm Preliminary Design Review (PDR)	3	2019	3	2019
7.62mm User Assessment	4	2020	1	2021
7.62mm Pre-Production Qualification Test (PPQT)	4	2020	2	2021
7.62mm Critical Design Review (CDR)	2	2021	2	2021
7.62mm Development Test & Evaluation (DT&E)	3	2020	3	2021
7.62mm Production Qualification Test (PQT)	4	2021	1	2022
7.62mm Live Fire Test and Evaluation (LFT&E)	4	2021	1	2022
7.62mm Limited User Evaluation (LUE)	4	2021	1	2022
7.62mm Milestone C	3	2022	3	2022
5.56mm Materiel Development Decision (MDD)	3	2018	3	2018
5.56mm Project Starts on BA04 EB8	3	2018	3	2018
5.56mm Multiple Concept Design Evaluation	4	2018	4	2020
5.56mm Cavity Design Test	1	2020	3	2020
5.56mm Technology Readiness Level 6	4	2020	4	2020
5.56mm Milestone B (MS-B)	1	2021	1	2021
5.56mm Transitions from BA04 EB8 to BA05 EP4	1	2021	1	2021

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**Exhibit R-4A, RDT&E Schedule Details:** PB 2022 Army **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603639A / <i>Tank and Medium Caliber Ammunition</i>	<b>Project (Number/Name)</b> EB8 / <i>OWL for Small Caliber Ammunition</i>
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Events	Start		End	
	Quarter	Year	Quarter	Year
5.56mm Engineering and Manufacturing Development (EMD)	1	2021	3	2024
5.56mm Design Verification Test	4	2021	4	2021
5.56mm Preliminary Design Review (PDR)	1	2022	1	2022
5.56mm User Assessment	1	2022	3	2022
5.56mm Critical Design Review (CDR)	4	2022	4	2022
5.56mm Development Test & Evaluation (DT&E)	4	2022	1	2023
5.56mm Production Qualification Testing (PQT)	4	2023	1	2024
5.56mm Live-Fire Test and Evaluation (LFT&E)	4	2023	1	2024
5.56mm Milestone C (MS-C)	4	2024	4	2024
NGSW & .50 caliber Concept Design Evaluation	1	2020	2	2021

**Note**

As the technology matures, Project EB8 One-Way Luminescence (OWL) for Small Caliber funding transitioned to Budget Activity (BA) 5 Program Element (PE) 0604802A Weapons and Munitions - Eng Dev Weapons and Munitions - Eng Dev Project EP4 OWL Small Caliber Ammo.

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army										<b>Date:</b> May 2021		
<b>Appropriation/Budget Activity</b> 2040 / 4					<b>R-1 Program Element (Number/Name)</b> PE 0603639A / Tank and Medium Caliber Ammunition				<b>Project (Number/Name)</b> EB9 / Aviation Airborne Expendable Countermeasures			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022 Base</b>	<b>FY 2022 OCO</b>	<b>FY 2022 Total</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>FY 2026</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
EB9: Aviation Airborne Expendable Countermeasures	-	3.055	4.332	5.529	-	5.529	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**Note**

Project EB9 / Aviation Airborne Expendable Countermeasures within PE 0603639A / Tank and Medium Caliber Ammunitions transitions to Engineering and Manufacturing Development (EMD) under Project EP7 / Aviation Airborne Expendable Countermeasures within PE 0604802A / Weapons and Munitions - Eng Dev.

**A. Mission Description and Budget Item Justification**

Project EB9 Aviation Airborne Expendable Countermeasure (AAECM) supports the advanced development activities and technology demonstrations of the AAECM to include the XM215 Flare and XM20 Radio Frequency (RF) expendables. These expendable countermeasures systems are essential parts for Army aircraft and will be employed with currently fielded countermeasures as a cocktail to provide protection against all threats. Army Research Development Technology & Evaluation (RDT&E) efforts are coordinated with Program Executive Office (PEO) Aviation to address the AAECM capability, a critical Aircraft Survivability Equipment (ASE) enabler for enduring aircraft and the Future Vertical Lift (FVL) Cross Functional Team (CFT) within the Army's top modernization priorities.

These advanced decoys will address deficiencies in Army aircraft protection and the safety of its aircrews against advanced Man-Portable Air Defense Systems (MANPADS) and shoulder launched Surface-to-Air Missiles (SAM) systems. This program will evaluate integrated technologies and countermeasure prototype systems in realistic operating test environments. Prototypes will demonstrate component and subsystem maturity prior to integration into major Army aircraft platforms. FY 2022 supports final developmental and initial operational testing for the XM20 RF Countermeasures (CM) ahead of the planned Milestone C in FY 2022.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
<b>Title:</b> Expendable Countermeasures to Guided Missile Threats	3.055	4.332	5.529
<b>Description:</b> This program will develop expendable countermeasure decoys which will protect Army aircraft from surface-to-air missiles.			
<b>FY 2021 Plans:</b> Complete final XM20 Technology Maturation & Risk Reduction (TMRR) efforts and transition into Engineering and Manufacturing Development activities, conduct flight testing and Modeling and Simulation efforts.			
<b>FY 2022 Plans:</b> Finalize XM20 flight testing and conduct initial operational test and evaluation to support the Milestone C decision.			
<b>FY 2021 to FY 2022 Increase/Decrease Statement:</b>			

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603639A / Tank and Medium Caliber Ammunition	<b>Project (Number/Name)</b> EB9 / Aviation Airborne Expendable Countermeasures

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
Increase in funding in FY 2022 is due to the final developmental and operational testing that will be conducted in FY 2022.			
<b>Accomplishments/Planned Programs Subtotals</b>	3.055	4.332	5.529

**C. Other Program Funding Summary (\$ in Millions)**

<b>Line Item</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022 Base</b>	<b>FY 2022 OCO</b>	<b>FY 2022 Total</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>FY 2026</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
• EP7: Aviation Airborne Expendable Countermeasures	4.717	4.313	7.526	-	7.526	-	-	-	-	-	-

**Remarks**

Project EB9 / Aviation Airborne Expendable Countermeasures within PE 0603639A / Tank and Medium Caliber Ammunition transitions to Engineering and Manufacturing Development (EMD) under Project EP7 / Aviation Airborne Expendable Countermeasures within PE 0604802A / Weapons and Munitions - Eng Dev

**D. Acquisition Strategy**

During the Materiel Solution Analysis (MSA), Milestone A phase, prototypes developed by the US Government (USG) and contractors were tested and evaluated against initial CDD requirements. The contractor developed XM20 design and the USG developed XM215 design were selected to enter into Engineering and Manufacturing Development (EMD), Milestone B phase, to finalize the design based on lessons learned from the MSA flight test and CDD requirements. The USG starts the transition to industry via Other Transaction Authority (OTA) contract mechanism in FY 2021. Industry prototypes will undergo Developmental and Operational Testing and final XM215 and XM20 configurations to support Milestone C in FY 2022.



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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army** **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603639A / Tank and Medium Caliber Ammunition	<b>Project (Number/Name)</b> EB9 / Aviation Airborne Expendable Countermeasures
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<b>Product Development (\$ in Millions)</b>				<b>FY 2020</b>		<b>FY 2021</b>		<b>FY 2022 Base</b>		<b>FY 2022 OCO</b>		<b>FY 2022 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>			
XM20 Testing Hardware	C/FFP	TBD : TBD	-	-		-		1.350	Oct 2021	-		1.350	0.000	1.350	-
XM20 Development	C/FFP	Armtec : Lillington, NC	1.560	1.131	Oct 2020	-		-		-		-	0.000	2.691	-
XM215 Development	MIPR	DEVCOM Armaments Center : Picatinny Arsenal, NJ	3.532	-		-		-		-		-	0.000	3.532	-
<b>Subtotal</b>			5.092	1.131		-		1.350		-		1.350	0.000	7.573	N/A

<b>Support (\$ in Millions)</b>				<b>FY 2020</b>		<b>FY 2021</b>		<b>FY 2022 Base</b>		<b>FY 2022 OCO</b>		<b>FY 2022 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>			
XM20 Engineering Support	MIPR	DEVCOM Armaments Center : Picatinny Arsenal, NJ	0.650	0.530	Aug 2020	0.770	Feb 2021	0.789	Oct 2021	-		0.789	0.000	2.739	-
XM20 Contractor Support	C/FFP	Booz Allen Hamilton : Aberdeen, MD	-	-		0.106	Apr 2021	0.175	Nov 2021	-		0.175	0.000	0.281	-
XM20 Engineering Support	MIPR	DEVCOM C5ISR : Aberdeen Proving Ground, MD	-	0.222	May 2020	-		-		-		-	0.000	0.222	-
<b>Subtotal</b>			0.650	0.752		0.876		0.964		-		0.964	0.000	3.242	N/A

<b>Test and Evaluation (\$ in Millions)</b>				<b>FY 2020</b>		<b>FY 2021</b>		<b>FY 2022 Base</b>		<b>FY 2022 OCO</b>		<b>FY 2022 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>			
XM20 Operational Test and Evaluation	MIPR	Various : Various	-	-		-		3.215	Mar 2022	-		3.215	0.000	3.215	-
XM20 Design Verification and Flight Testing	MIPR	Various : Various	-	0.739	Jan 2021	3.274	Jul 2021	-		-		-	0.000	4.013	-

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army** **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603639A / Tank and Medium Caliber Ammunition	<b>Project (Number/Name)</b> EB9 / Aviation Airborne Expendable Countermeasures
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Test and Evaluation (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
XM20 Modeling & Simulation	C/FFP	Booz Allen Hamilton : McLean, VA	1.072	0.433	May 2020	0.182	Apr 2021	-		-		-	0.000	1.687	-
XM215 Flight Test and Evaluation	MIPR	Various : Various	4.200	-		-		-		-		-	0.000	4.200	-
XM20 Flight Test and Evaluation	MIPR	Various : Various	2.560	-		-		-		-		-	0.000	2.560	-
<b>Subtotal</b>			<b>7.832</b>	<b>1.172</b>		<b>3.456</b>		<b>3.215</b>		<b>-</b>		<b>3.215</b>	<b>0.000</b>	<b>15.675</b>	<b>N/A</b>

	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
<b>Project Cost Totals</b>	13.574	3.055	4.332	5.529	-	5.529	0.000	26.490	N/A

Remarks

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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2022 Army</b>		<b>Date: May 2021</b>
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603639A / <i>Tank and Medium Caliber Ammunition</i>	<b>Project (Number/Name)</b> EB9 / <i>Aviation Airborne Expendable Countermeasures</i>

Event Name	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026							
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4				
<b>Radio Frequency (RF) Development</b>																																
XM20 Technology Maturation and Risk Reduction	[Blue Bar]																															
	XM20 TMRR																															
XM20 Flight Testing	[Blue Bar]																															
	XM20 Flight Test																															
XM20 Modeling and Simulation	[Blue Bar]																															
	XM20 M&S																															
XM20 Data Analysis					[Blue Bar]																											
					XM20 MS-B Prep																											
XM20 Milestone B					▲ 2																											
					XM20 MS-B																											
XM20 Development Contract					[Blue Bar]																											
					XM20 EMD																											
XM20 Qualification Build					[Blue Bar]																											
					XM20 Qual Build																											
XM20 Critical Design Review					▲ 3																											
					XM20 CDR																											
XM20 Production Qualification Testing									[Blue Bar]																							
									XM20 PQT																							
XM20 Milestone C													▲ 4																			
													XM20 MS-C																			
XM20 Operational Test and Evaluation																	[Blue Bar]															
																	XM20 OT&E															
<b>XM215 Development</b>																																

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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2022 Army</b>		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603639A / Tank and Medium Caliber Ammunition	<b>Project (Number/Name)</b> EB9 / Aviation Airborne Expendable Countermeasures

Event Name	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
XM215 Prototyping		■																										
		■																										
XM215 Testing Efforts (Stability/Heat/Cold)	■	■																										
	■	■																										
XM215 Flight Testing		■																										
		■																										
XM215 Milestone B		▲																										
		▲																										
XM215 Engineering and Manufacturing Development	■	■	■	■	■	■	■	■	■	■	■	■																
	■	■	■	■	■	■	■	■	■	■	■	■																
XM215 Design Verification Test						■																						
						■																						
XM215 Flight Test										■	■																	
										■	■																	
XM215 Developmental and Operational Testing														■	■													
														■	■													
XM215 Milestone C																										▲		
																										▲		

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603639A / <i>Tank and Medium Caliber Ammunition</i>	<b>Project (Number/Name)</b> EB9 / <i>Aviation Airborne Expendable Countermeasures</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Radio Frequency (RF) Development	1	2019	4	2025
XM20 Milestone A	1	2019	1	2019
XM20 Prototype Development	1	2019	4	2019
XM20 Demonstrations	2	2019	3	2019
XM20 Technology Maturation and Risk Reduction	1	2020	2	2021
XM20 Flight Testing	2	2020	2	2020
XM20 Modeling and Simulation	3	2020	4	2020
XM20 Data Analysis	1	2021	2	2021
XM20 Milestone B	2	2021	2	2021
XM20 Development Contract	2	2021	1	2022
XM20 Qualification Build	2	2021	3	2021
XM20 Critical Design Review	3	2021	3	2021
XM20 Production Qualification Testing	4	2021	2	2022
XM20 Milestone C	3	2022	3	2022
XM20 Operational Test and Evaluation	4	2022	4	2022
XM215 Development	1	2019	4	2025
XM215 Milestone A	1	2019	1	2019
XM215 Prototyping	1	2019	2	2020
XM215 Down Select	3	2019	3	2019
XM215 Testing Efforts (Stability/Heat/Cold)	3	2019	2	2020
XM215 Flight Testing	1	2020	2	2020
XM215 Milestone B	2	2020	2	2020

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**Exhibit R-4A, RDT&E Schedule Details:** PB 2022 Army **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603639A / <i>Tank and Medium Caliber Ammunition</i>	<b>Project (Number/Name)</b> EB9 / <i>Aviation Airborne Expendable Countermeasures</i>
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Events	Start		End	
	Quarter	Year	Quarter	Year
XM215 Engineering and Manufacturing Development	2	2020	4	2022
XM215 Design Verification Test	2	2021	3	2021
XM215 Flight Test	4	2021	2	2022
XM215 Developmental and Operational Testing	3	2022	4	2022
XM215 Milestone C	4	2022	4	2022

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**Exhibit R-2A, RDT&E Project Justification:** PB 2022 Army **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4					<b>R-1 Program Element (Number/Name)</b> PE 0603639A / Tank and Medium Caliber Ammunition				<b>Project (Number/Name)</b> EC2 / Adv Armor-Piercing (ADVAP) for Small Cal Ammo			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022 Base</b>	<b>FY 2022 OCO</b>	<b>FY 2022 Total</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>FY 2026</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
EC2: Adv Armor-Piercing (ADVAP) for Small Cal Ammo	-	8.572	-	-	-	-	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

The Advanced Armor-Piercing (ADVAP) project is a critical technology development in response to the 7.62 millimeter (mm) and 5.56mm Family of Ammunition Capabilities Development Documents (CDD) and the Soldier Lethality Cross Functional Team (SL CFT) Initial Capability Document (ICD) which outlines the requirements for new ammunition to support the rapid prototyping/development of the Next Generation Squad Weapons (NGSW) under the Middle Tier of Acquisition (MTA) authority for rapid prototyping/rapid fielding. New ADVAP ammunition is designed to provide overmatch capability to defeat advanced light armored threats within typical machine gun engagement ranges.

The Next Generation Squad Weapons (NGSW) ammunition is split into two initial variants, the General Purpose (GP) and the Special Purpose (SP). The nomenclature for the GP ammunition is XM1186 and the nomenclature for the SP ammunition is XM1184. The overall objective of the ADVAP project is to develop and Full Materiel Release (FMR) ammunition to defeat hard targets.

There is no Fiscal Year (FY) 2022 funding request.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
<b>Title:</b> Small Caliber Ammunition Rapid Prototyping	8.572	-	-
<b>Description:</b> Develop, demonstrate, and qualify small caliber ADVAP cartridges that can defeat threat targets and provide overmatch capability versus a broad spectrum of hard targets.			
<b>Accomplishments/Planned Programs Subtotals</b>	8.572	-	-

**C. Other Program Funding Summary (\$ in Millions)**

<b>Line Item</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022 Base</b>	<b>FY 2022 OCO</b>	<b>FY 2022 Total</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>FY 2026</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
• FL4: Small Caliber Ammo for Next Gen Squad Weapons	17.432	26.483	28.372	-	28.372	-	-	-	-	-	-

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603639A / <i>Tank and Medium Caliber Ammunition</i>	<b>Project (Number/Name)</b> EC2 / <i>Adv Armor-Piercing (ADVAP) for Small Cal Ammo</i>

**C. Other Program Funding Summary (\$ in Millions)**

<u>Line Item</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022</u> <u>Base</u>	<u>FY 2022</u> <u>OCO</u>	<u>FY 2022</u> <u>Total</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>FY 2026</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
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**Remarks**

These funding lines support EMD activities for the 7.62mm ADVAP ammunition and rapid prototyping/development of GP and SP ammunition for the NGSW systems. Other Program Funding in Budget Activity 05 (BA 05) PE 0604802A, Project EP5 ADVAP for Small Cal Ammo and BA 05 PE 0604802A Weapons and Munitions - Eng Dev Project FL4 Small Caliber Ammo for Next Gen Squad Weapons

**D. Acquisition Strategy**

New ammunition development effort for Next Generation Squad Weapons (NGSW) systems, will utilize the MTA authority for rapid prototyping/rapid fielding. The project will utilize Government developed projectile designs that will be delivered to development contractors as Government Furnished Material (GFM). The Government will select up to three contractors for the weapon system development and down-select to a single contractor in FY 2022, prior to production contract award.



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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army												Date: May 2021			
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)							
2040 / 4				PE 0603639A / Tank and Medium Caliber Ammunition				EC2 I Adv Armor-Piercing (ADVAP) for Small Cal Ammo							
Product Development (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Projectile Development	Option/CPFF	Northrop Grumman Innovation Systems : Independence, MO	1.046	-		-		-		-		-	Continuing	Continuing	Continuing
Ammo Development Support 1	Option/CPFF	SAVIT Corporation : Rockaway, New Jersey	-	0.664	Jul 2020	-		-		-		-	Continuing	Continuing	Continuing
Ammo Development Support 2	Option/CPFF	Concurrent Technologies Corporation (CTC) : Johnstown, Pennsylvania	-	1.014	Aug 2020	-		-		-		-	Continuing	Continuing	Continuing
Projectile Development	Option/CPFF	OLIN Winchester Corporation : Independence, MO	-	0.763	Sep 2020	-		-		-		-	Continuing	Continuing	Continuing
Ammo Cartridge Development 1	Option/CPFF	Sig Sauer : Newington, NH	0.500	0.500	Sep 2020	-		-		-		-	Continuing	Continuing	Continuing
Ammo Cartridge Development 2	Option/CPFF	General Dynamics : Florham Park, NJ	0.500	0.500	Sep 2020	-		-		-		-	Continuing	Continuing	Continuing
Ammo Cartridge Development 3	Option/CPFF	Textron Systems : Hunt Valley, Maryland	-	0.500	Sep 2020	-		-		-		-	Continuing	Continuing	Continuing
<b>Subtotal</b>			2.046	3.941		-		-		-		-	Continuing	Continuing	N/A
Support (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Combat Capabilities Development Command Armaments Center (CCDC AC)	MIPR	Picatinny Arsenal : New Jersey	8.067	2.293	Oct 2019	-		-		-		-	Continuing	Continuing	Continuing

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army												Date: May 2021			
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)							
2040 / 4				PE 0603639A / Tank and Medium Caliber Ammunition				EC2 I Adv Armor-Piercing (ADVAP) for Small Cal Ammo							
<b>Support (\$ in Millions)</b>				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Prototype Manufacturing Support	Option/FFP	UTRS Inc. : Mount Arlington, New Jersey	-	0.844	Sep 2020	-		-		-		-	0.000	0.844	-
Army Research Lab (ARL)	MIPR	Aberdeen : Maryland	2.608	0.694	Oct 2019	-		-		-		-	Continuing	Continuing	Continuing
<b>Subtotal</b>			10.675	3.831		-		-		-		-	Continuing	Continuing	N/A
<b>Test and Evaluation (\$ in Millions)</b>				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Army Research Lab (ARL)	MIPR	Aberdeen : Maryland	3.200	0.500	Oct 2019	-		-		-		-	Continuing	Continuing	Continuing
Testing Support	MIPR	Air Force Research Lab : Wright-Patterson AFB, Ohio	-	0.300	Sep 2020	-		-		-		-	Continuing	Continuing	Continuing
<b>Subtotal</b>			3.200	0.800		-		-		-		-	Continuing	Continuing	N/A
<b>Project Cost Totals</b>			15.921	8.572		0.000		-		-		-	Continuing	Continuing	N/A
<b>Remarks</b>															


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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2022 Army</b>		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603639A / Tank and Medium Caliber Ammunition	<b>Project (Number/Name)</b> EC2 / Adv Armor-Piercing (ADVAP) for Small Cal Ammo

Event Name	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
NGSW Ammo Rapid Prototyping	[Redacted]																											
NGSW Ammo Preliminary Design Review Special Purpose (PDR-SP)	▲ 1																											
NGSW Ammo Critical Design Review General Purpose (CDR-GP)		▲ 2																										
NGSW Ammo Prototype Test 1			■																									
NGSW Ammo Initial Product Review 3 (IPR 3) Special Purpose			▲ 3																									
NGSW Ammo Full Materiel Release (FMR) Transitions from BA04 EC2 to BA05 FL4				▲ 4																								
NGSW Ammo Critical Design Review Special Purpose (CDR-SP)					▲ 5																							
NGSW Ammo Prototype Test 2						■																						
NGSW Ammo Safety Testing (SP)										■																		
NGSW Ammo Urgent Materiel Release General Purpose (UMR GP)														▲ 6														
NGSW Ammo Urgent Materiel Release Special Purpose (UMR SP)														▲ 7														
NGSW Ammo Rapid Fielding															■													
NGSW Ammo Production Qualification Testing Special Purpose (PQT SP)															■													

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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2022 Army</b>			<b>Date: May 2021</b>
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603639A / <i>Tank and Medium Caliber Ammunition</i>	<b>Project (Number/Name)</b> EC2 / <i>Adv Armor-Piercing (ADVAP) for Small Cal Ammo</i>	

Event Name	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
NGSW Ammo Full Materiel Release (FMR)																	 NGSW Ammo FMR											

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603639A / <i>Tank and Medium Caliber Ammunition</i>	<b>Project (Number/Name)</b> EC2 / <i>Adv Armor-Piercing (ADVAP) for Small Cal Ammo</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
NGSW Ammo Rapid Prototyping	1	2019	2	2024
NGSW Ammo Initial Product Review 1 (IPR 1) Special Purpose	2	2019	2	2019
NGSW Ammo Preliminary Design Review General Purpose (PDR-GP)	3	2019	3	2019
NGSW Ammo Initial Product Review 2 (IPR 2) Special Purpose	4	2019	4	2019
NGSW Ammo Preliminary Design Review Special Purpose (PDR-SP)	2	2020	2	2020
NGSW Ammo Critical Design Review General Purpose (CDR-GP)	3	2020	3	2020
NGSW Ammo Prototype Test 1	3	2020	4	2020
NGSW Ammo Initial Product Review 3 (IPR 3) Special Purpose	4	2020	4	2020
NGSW Ammo Full Materiel Release (FMR) Transitions from BA04 EC2 to BA05 FL4	2	2021	2	2021
NGSW Ammo Critical Design Review Special Purpose (CDR-SP)	2	2021	2	2021
NGSW Ammo Prototype Test 2	2	2021	3	2021
NGSW Ammo Safety Testing (SP)	1	2022	3	2022
NGSW Ammo Urgent Materiel Release General Purpose (UMR GP)	4	2022	4	2022
NGSW Ammo Urgent Materiel Release Special Purpose (UMR SP)	4	2022	4	2022
NGSW Ammo Rapid Fielding	4	2022	1	2026
NGSW Ammo Production Qualification Testing Special Purpose (PQT SP)	1	2023	2	2023
NGSW Ammo Full Materiel Release (FMR)	2	2024	2	2024

**Note**

Note: Next Generation Squad Weapon (NGSW)

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army										<b>Date:</b> May 2021		
<b>Appropriation/Budget Activity</b> 2040 / 4					<b>R-1 Program Element (Number/Name)</b> PE 0603639A / Tank and Medium Caliber Ammunition				<b>Project (Number/Name)</b> EC3 / Ammunition Logistics Prototyping			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022 Base</b>	<b>FY 2022 OCO</b>	<b>FY 2022 Total</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>FY 2026</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
EC3: Ammunition Logistics Prototyping	-	1.462	1.650	2.141	-	2.141	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

This Project supports the future force by improving the distribution, management, reliability and survivability of ammunition through the advanced development, integration, and demonstration of logistics system enablers. These enablers will improve the efficiency and effectiveness of ammunition operations, to include retrograde, while reducing the logistics footprint on the battlefield. Technology areas addressed include handling, distribution, and management (strategic and tactical), prognostics, diagnostics, and asset visibility, explosives safety, and adaptive and environmentally friendly packaging and palletization. The efficient deployment and sustainment of reliable ammunition is vital to success on the battlefield. This Project enhances the operational effectiveness of the ammunition logistics system to ensure the distribution of reliable ammunition to the warfighter. Fiscal Year (FY) 2022 funding will be used to further mature munition health monitoring devices in accordance with the needs of the relevant PMs. However, the preponderance of the funding will be used to directly to support Long Range Precision Fire (LRPF) munition health monitoring requirements throughout its resupply process. Specifically, the funding will be used to address munition health monitoring and packaging/preservation of munitions within the tactical movement of large caliber ammunition.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
<b>Title:</b> Munitions Health and Inventory Monitoring Systems	0.997	1.150	1.065
<p><b>Description:</b> Performance and reliability of certain munitions can be degraded by the environmental exposure history they experience during their lifetime. This Project will develop simple to complex environmental health and inventory monitoring systems to improve reliability and asset visibility and enable effective Condition Based Management for Ammunition. All research and development initiatives will be supporting the Long Range Precision Fires (LRPF) &amp; Soldier Lethality (SL) Cross Functional Teams (CFTs) and the multi domain operations modernization objectives that consume, store or transport/distribute munitions and munition components in the maneuver formations.</p> <p><b>FY 2021 Plans:</b> Develop system engineering plan and conduct analysis to identify COTS sensing technologies for application to LRPF and Soldier Lethality munition storage and distribution requirements to ensure munition components reliability through last tactical mile.</p> <p><b>FY 2022 Plans:</b> Develop technologies for monitoring the health of ammunition out of its standard depot pack after issuance from the wholesale ammunition system. Assess utility of providing actionable intelligence through use of the Tactical Ammunition Management System (TAMS).</p> <p><b>FY 2021 to FY 2022 Increase/Decrease Statement:</b></p>			

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army		<b>Date:</b> May 2021		
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603639A / <i>Tank and Medium Caliber Ammunition</i>	<b>Project (Number/Name)</b> EC3 / <i>Ammunition Logistics Prototyping</i>		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
Slight decrease due to items transitioning to the next level of maturity.				
<b>Title:</b> Munitions Containerization Systems		0.465	0.500	1.076
<b>Description:</b> For each family of munitions containers, optimize prototype container systems for automation compatibility, combat unit load quantity, sustainability/recyclability, Insensitive Munitions/explosives safety, environmental protection, load reconfiguration, unitization, and standardized interfaces. This will improve ammunition distribution efficiency while minimizing environmental and operational impacts.				
<b>FY 2021 Plans:</b> Conduct test and evaluation on injection molded cylindrical container for integration with 120mm mortar ammunition. Conduct test and evaluation on injection molded rectangular container for integration with 6.8mm small arms ammunition.				
<b>FY 2022 Plans:</b> Pending PM MAS FY21 approval, conduct qualification testing on plastic rectangular injection molded containers/consolidators that are designed to reduce unit logistics & soldier burden and interface with increasingly automated weapon and sustainment systems, for integration with ammunition items under development by PM MAS that support Soldier Lethality CFT modernization objectives. Pending PM CAS FY21 approval, conduct qualification testing on plastic cylindrical injection molded containers/consolidators that are designed to reduce unit logistics & soldier burden and interface with increasingly automated weapon and sustainment systems, for integration with ammunition items under development by PM CAS that support legacy BCT operations. Develop LRPF munition inner packaging barrier based on environmental assessment completed in FY21.				
<b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> The funding increase is due to support for Long Range Precision Fire (LRPF) and Soldier Lethality packaging requirements for emerging weapons systems.				
<b>Accomplishments/Planned Programs Subtotals</b>		1.462	1.650	2.141
<b>C. Other Program Funding Summary (\$ in Millions)</b>				
N/A				
<b>Remarks</b>				
<b>D. Acquisition Strategy</b>				
Fiscal Year (FY) 2022 funding will be used to further mature munition health monitoring devices in accordance with the needs of the relevant PMs. However, the preponderance of the funding will be used to directly to support Long Range Precision Fire (LRPF) munition health monitoring requirements throughout its resupply process. Specifically, the funding will be used to address munition health monitoring and packaging/preservation of munitions within the tactical movement of large caliber ammunition.				

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army** **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603639A / Tank and Medium Caliber Ammunition	<b>Project (Number/Name)</b> EC3 / Ammunition Logistics Prototyping
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<b>Product Development (\$ in Millions)</b>				<b>FY 2020</b>		<b>FY 2021</b>		<b>FY 2022 Base</b>		<b>FY 2022 OCO</b>		<b>FY 2022 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>			
Next Generation Temperature Humidity Indicator	C/FFP	AGM : Tuscon, AZ	0.878	0.387	Dec 2019	-		-		-		-	0.000	1.265	-
Contract - Low Cost Thermal Indicator	C/FFP	Innosense : Torrance, CA	2.531	-		-		-		-		-	0.000	2.531	-
Contract - Remote Readiness Asset Prognostic/Diagnostic System (RRAPDS)	C/FFP	Karagozian & Case : Glendale, CA	1.152	-		-		-		-		-	0.000	1.152	-
Contract-Plastic Cylindrical Container	C/FFP	SAVIT : Rockaway, NJ	0.647	-		-		0.250	Jan 2022	-		0.250	0.000	0.897	-
Contract-Plastic Rectangular Container	C/FFP	SAVIT : Rockaway, NJ	-	0.505	May 2020	0.200	Mar 2021	0.250	Jan 2022	-		0.250	0.000	0.955	-
Advanced Munitions Health Monitoring System	C/FFP	TBD : TBD	-	-		-		0.300	Jan 2022	-		0.300	0.000	0.300	-
Tactical Munitions Health Monitoring System	C/FFP	Cybernet : Ann Arbor, MI	-	-		0.650	Mar 2021	0.300	Jan 2022	-		0.300	0.000	0.950	-
<b>Subtotal</b>			5.208	0.892		0.850		1.100		-		1.100	0.000	8.050	N/A

<b>Support (\$ in Millions)</b>				<b>FY 2020</b>		<b>FY 2021</b>		<b>FY 2022 Base</b>		<b>FY 2022 OCO</b>		<b>FY 2022 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>			
Combat Capabilities Development Command Armaments Center (CCDC AC)	MIPR	Picatinny Arsenal : NJ	4.000	0.570	Dec 2019	0.800	Dec 2020	0.841	Nov 2021	-		0.841	0.000	6.211	-
<b>Subtotal</b>			4.000	0.570		0.800		0.841		-		0.841	0.000	6.211	N/A



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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army** **Date: May 2021**

<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603639A / <i>Tank and Medium Caliber Ammunition</i>	<b>Project (Number/Name)</b> EC3 / <i>Ammunition Logistics Prototyping</i>
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<b>Test and Evaluation (\$ in Millions)</b>				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Yuma Proving Ground	MIPR	Yuma : AZ	0.086	-		-		-		-		-	0.000	0.086	-
Test and Evaluation	MIPR	TBD : TBD	0.150	-		-		0.200	Mar 2022	-		0.200	0.000	0.350	-
<b>Subtotal</b>			0.236	-		-		0.200		-		0.200	0.000	0.436	N/A

	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
<b>Project Cost Totals</b>	9.444	1.462	1.650	2.141	-	2.141	0.000	14.697	N/A

**Remarks**

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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2022 Army</b>		<b>Date: May 2021</b>
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603639A / Tank and Medium Caliber Ammunition	<b>Project (Number/Name)</b> EC3 / Ammunition Logistics Prototyping

Event Name	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Advanced Concept Development-Munitions Containerization-1																												
Advanced Concept Development-Munitions Containerization-1A																												
Advanced Concept Development-Munitions Health Monitoring-3																												
Advanced Munitions Health Monitoring System																												
Tactical Munitions Health Monitoring System																												

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603639A / <i>Tank and Medium Caliber Ammunition</i>	<b>Project (Number/Name)</b> EC3 / <i>Ammunition Logistics Prototyping</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Advanced Concept Development-Munitions Containerization-1	1	2022	4	2022
Advanced Concept Development-Munitions Containerization-1A	1	2020	4	2022
Advanced Concept Development-Munitions Health Monitoring-3	3	2017	4	2020
Advanced Munitions Health Monitoring System	1	2022	4	2024
Tactical Munitions Health Monitoring System	2	2021	4	2024

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army										<b>Date:</b> May 2021		
<b>Appropriation/Budget Activity</b> 2040 / 4					<b>R-1 Program Element (Number/Name)</b> PE 0603639A / Tank and Medium Caliber Ammunition				<b>Project (Number/Name)</b> FA5 / Assured Precision Weapons and Munitions			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022 Base</b>	<b>FY 2022 OCO</b>	<b>FY 2022 Total</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>FY 2026</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
FA5: Assured Precision Weapons and Munitions	-	29.981	28.788	43.005	-	43.005	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

The Assured Precision Weapons and Munitions (APWM) - FA5 Project is focused on advanced risk mitigation, technology integration, prototyping, and product support to identify, evaluate, mature, test, and demonstrate various assured precision prototype technologies in weapon and munitions components and subsystems within a complex system-of-systems (SoS) environment. The APWM Project reinforces the National Defense Strategy's major lines of effort through technology development and prototyping, which increases lethality and ensures future combat overmatch success of the Joint Force against peer/near-peer adversaries. This project also aims to improve program performance and affordability for multiple weapons and munitions Programs of Record (PoRs) via Joint Lethality Positioning, Navigation and Timing (PNT) and Army M-Code Global Positioning System (GPS) coordinated efforts. The APWM Project directly supports top Army Modernization Priorities via the Assured-PNT (A-PNT) and Long Range Precision Fires (LRPF) Cross Functional Team (CFT) imperatives in support of the National Defense Strategy. Funding will support engagement by weapons and munitions PNT experts in the development, evaluation, and technology delivery activities of the Air Force's M-Code GPS, Army's PNT related programs, and A-PNT/Space CFT programs in support of LRPF and Counter Anti-Access/Area Denial (A2/AD) missions. Funding will also enable component and subsystem architecture input essential for Precision Weapons and Munitions (PW&M) operating in a Navigation Warfare (NavWar) SoS environment, Army M-Code GPS technology integration and evaluation, planning and evaluating next generation M-Code GPS to validate capability for future Joint precision munitions, and maturation of alternative PNT and NavWar related technologies and solutions to enable informed A-PNT related PoR milestone and Army cross-functional modernization decisions.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
<b>Title:</b> APWM Integrated Product Support - Joint Lethality PNT SME Working Integrated Product Team (WIPT) & Program Management	3.397	3.526	3.566
<b>Description:</b> Provide APWM technical subject matter expertise and support to the Joint oversight board for APWM. Provide overall APWM Project Program Management support.			
<b>FY 2021 Plans:</b> The subject matter experts will continue coordinating with and supporting the development and technology delivery activities of the A-PNT/Space CFT, Air Force's MGUE program and the Army's PNT related programs including participation in design reviews, evaluation and formal feedback on technology and systems requirements and performance, component and subsystem architecture input essential for precision weapons and munitions operating in a system-of-systems environment, and configuration			

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army		<b>Date:</b> May 2021		
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603639A / <i>Tank and Medium Caliber Ammunition</i>	<b>Project (Number/Name)</b> FA5 / <i>Assured Precision Weapons and Munitions</i>		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
<p>management of the evolving Joint Common GPS Specification and Interface Control Document for PGMs. Specific support focus includes requirements for MGUE Increment 2 and alternative PNT technology maturity.</p> <p><b>FY 2022 Plans:</b> The Subject Matter Experts (SMEs) will continue coordinating with and supporting the development and technology delivery activities of the Joint Weapons and Munitions community, to include PNT modernization and NavWar related programs including participation in design reviews, evaluation and formal feedback on technology and systems requirements and performance, component and subsystem architecture input essential for precision weapons and munitions operating in a SoS multi-domain environment, and configuration management of the evolving Precision Guided Munition (PGM) Technical Requirements Document (TRD). Specific support focus includes requirements for Military GPS User Equipment (MGUE) Increment 2 and alternative PNT technology maturity.</p> <p><b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> Level of effort required in FY 2022 is slightly higher than FY 2021 due to A-PNT/Space CFT and Air Force's MGUE program efforts, maturing NavWar initiatives, and increasing complexity of multi-domain operations (MDOs) impacting collaborative efforts for the Joint Lethality community.</p>				
<p><b>Title:</b> Assured PNT related Integration Risk Mitigation - A-PNT for Family of Scatterable Mines (FASCAM) Replacement</p> <p><b>Description:</b> Evaluate, mature and test A-PNT system/subsystem components for terrain shaping enabling technologies.</p>		1.904	-	-
<p><b>Title:</b> Assured PNT related Integration Risk Mitigation - NA2 for Weapons and Munitions Phase 2</p> <p><b>Description:</b> Perform Network Assisted APNT (NA2) SoS capability integration and pre system qualification integration risk reduction activities. Improve initial prototype NA2 capability and initiate improved prototype for subsequent transition to corresponding PoRs. Inform future NavWar related weapons and munitions platform dependencies. Integrate and synchronize AltNav capability delivery within NA2 to meet A-PNT/Space CFT AltNav Directed Requirement which summarizes the urgent need for AltNav initial operational capability (IOC) in two Brigade Combat Teams (BCTs) NLT 1QFY24.</p> <p><b>FY 2021 Plans:</b> Perform Assured PNT system-of-systems integration risk reduction activities. Refine NA2 sub-system prototype software. Conduct full system of systems integration test event for NA2 to mitigate risk of transitioning NA2 capability to the field via multiple Programs of Record to meet A-PNT/Space CFT AltNav Directed Requirement for Initial Operational Capability in FY 2024.</p> <p><b>FY 2021 to FY 2022 Increase/Decrease Statement:</b></p>		5.494	3.700	-

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army		<b>Date:</b> May 2021		
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603639A / <i>Tank and Medium Caliber Ammunition</i>	<b>Project (Number/Name)</b> FA5 / <i>Assured Precision Weapons and Munitions</i>		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
NA2 for Weapons and Munitions Phase 2 executes a SoS demonstration in FY 2021 with first generation PW&M APNT Technology. Prototyping and capability transition to Fires SoS APNT related AS and NavWar for spiral improvement to include next generation APNT technologies and NavWar.				
<p><b>Title:</b> Assured PNT related Integration Risk Mitigation - NA2 for Guided Rocket/Missile Launcher Systems</p> <p><b>Description:</b> Perform software development and prototyping activities to demonstrate NA2 capability for Rocket/Missile artillery launcher systems. Integrate and demonstrate upgraded artillery launcher system into the NA2 SoS networked capability to reduce subsequent PoR fielding risks. Integrate and synchronize AltNav capability delivery within NA2 to meet A-PNT/Space CFT AltNav Directed Requirements which summarizes the urgent need for AltNav IOC in two BCTs NLT 1QFY24.</p> <p><b>FY 2021 Plans:</b> Perform Assured PNT Rocket/Missile system-of-systems integration risk reduction activities. Refine Rocket/Missile artillery launcher NA2 prototype software. Conduct full system-of-systems integration developmental test event utilizing Rocket/Missile artillery launchers for NA2 to mitigate risk of transitioning NA2 capability to the field to meet A-PNT/Space CFT AltNav Directed Requirement for Initial Operational Capability in FY 2024.</p> <p><b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> NA2 for Guided Rocket/Missile Launcher Systems executes a SoS demonstration in FY 2021 with first generation PW&amp;M APNT Technology. Prototyping and capability transition to Fires SoS APNT related AS and NavWar for spiral improvement to include next generation APNT technologies and NavWar.</p>		2.956	2.000	-
<p><b>Title:</b> Fires System-of-Systems APNT related AS and Navigation Warfare (NavWar)</p> <p><b>Description:</b> Prototype PNT enabling technologies that are critical for executing Fires SoS NavWar missions to include munition-based offensive, defensive, and associated Command and Control (C2) functions. Prototyping efforts will focus on enabling combat lethality overmatch in PNT challenged environments for cannon and rocket/missile core missions. Prototype long range stand-off NavWar capability to penetrate contested A2/AD environments via use of long-range artillery, Fires SoS architectures enabling advanced NavWar attack, sense, and optimization, and advanced anti-jam/anti-spoof techniques for munitions.</p> <p><b>FY 2021 Plans:</b> Prototype PNT enabling technologies that are critical to APNT and AS operational capabilities within the fires system-of-systems domain. Prototyping efforts will focus on enabling and or maintaining combat lethality overmatch in PNT challenged environments for cannon and rocket/missile applications. Design and develop a gun-hardened NavWar system prototype that can be demonstrated in a Live Fire Test from a 155mm artillery cargo round to prove its capability in FY 2022. Technical reports informing emerging gun-launched NavWar CONOPs and capability requirements.</p> <p><b>FY 2022 Plans:</b></p>		-	3.786	5.386

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army		<b>Date:</b> May 2021		
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603639A / <i>Tank and Medium Caliber Ammunition</i>	<b>Project (Number/Name)</b> FA5 / <i>Assured Precision Weapons and Munitions</i>		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
<p>Continue maturing initial prototypes for gun-hardened NavWar systems. Conduct integration activities of a gun-hardened NavWar system prototype and execute a Live Fire Test demonstration from a 155mm artillery cargo round. A technical report will document results of the gun-launched NavWar prototype. Identify and define the future Fires SoS MDO interdependencies to enable a suite of NAVWAR operational capabilities and develop near, mid, and long term MDO Fires and NAVWAR strategies to meet Army modernization imperatives.</p> <p><b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> FY 2022 continues maturing initial Fires SoS APNT related AS and NavWar prototypes leading up to an eventual live fire demonstration of capabilities. Level of effort increases from FY 2021 to FY 2022 due to continuation of prototyping efforts, added integration and demonstration efforts, and continued virtual prototyping of MDO solutions to meet Army modernization imperatives.</p>				
<p><b>Title:</b> Next Generation PNT Technologies Phase 1</p> <p><b>Description:</b> Continue prototyping APNT technologies to provide the next generation of APNT capability to weapons and munitions in a highly complex and fast paced battlefield. Will leverage prior Army Science &amp; Technology (S&amp;T), previous integrated demonstration events, information on threat advancement, and lessons learned to rapidly develop, integrate, prototype, and transition critical APNT technologies to weapons and munitions directly supporting LRPF and Air &amp; Missile Defense (AMD) initiatives.</p> <p><b>FY 2022 Plans:</b> Continue to mature and improve proven APNT technology for spiral development and integration into weapons and munitions to maintain combat lethality overmatch in highly contested PNT environments.</p> <p><b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> FY 2022 continues to spirally mature and integrate proven APNT technology utilizing prior prototyping and demonstration initiatives to outpace the threat and enable LRPF in a highly complex MDO environment requiring increased resources.</p>		-	-	1.500
<p><b>Title:</b> Assured PNT related Weapons &amp; Munitions Prototyping - AltNav Technologies (AltNav) Phase 2</p> <p><b>Description:</b> Conduct rapid development and prototyping of AltNav receivers for PGMs and assess operational feedback (receivers, enterprise service, and integration) of solutions to maximize utility of AltNav for LRPF meeting the intent of paragraph 6 of the A-PNT/Space CFT AltNav Directed Requirement. Demonstrate and conduct performance assessments of potential hardware and software solutions to support Artillery integration efforts as well as inform future Space-based PNT related alternatives for the Land Combat domain.</p> <p><b>FY 2021 Plans:</b></p>		4.962	3.175	-

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army		<b>Date:</b> May 2021		
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603639A / <i>Tank and Medium Caliber Ammunition</i>	<b>Project (Number/Name)</b> FA5 / <i>Assured Precision Weapons and Munitions</i>		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
Perform AltNav prototype integration activities to facilitate and conduct guide-to-hit PGM experiments. Generate AltNav performance evaluation and technology transition reports that meet the intent of the A-PNT/Space CFT AltNav Directed Requirement.				
<b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> AltNav technology, lessons learned, and investment strategies for spiral improvement transition to Next Generation PNT technologies Phase 1.				
<b>Title:</b> Assured PNT related Weapons & Munitions Prototyping - Location Azimuth Determinations System (LADS)		1.223	-	-
<b>Description:</b> Development and integration of prototype LADS to demonstrate an assured weapon survey capability within the M777A2 and M119A3 Howitzer Platforms.				
<b>Title:</b> Rocket/Missile Precision Guided Munition M-Code Prototyping		-	-	6.000
<b>Description:</b> Directly supports M-Code public law by rapidly prototyping M-Code receivers for direct transfer to rocket/missile systems.				
<b>FY 2022 Plans:</b> Prototyping of Army NAVSTORM-M capability for Deep Fire Artillery PGMs.				
<b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> FY 2022 increase directly supporting last year of M-Code receiver prototype development that will directly transition to rocket/missile applications.				
<b>Title:</b> Munition Deployed NavWar Countermeasures		-	-	6.014
<b>Description:</b> Prototype, integrate, and experiment with initial increment of Munition Deployed NavWar Countermeasures (MDNC) and weapons and munitions System of Systems dependencies directly supporting APNT/Space CFT NavWar initiatives and LRPF initiative of penetrating, disrupting, and disintegrating Anti Access/Area Denial (A2/AD) environments to enable employment of precision weapons and munitions.				
<b>FY 2022 Plans:</b> Evaluate and experiment with MDN-C solutions and weapons and munitions system of systems dependencies to penetrate and disrupt enemy A2 / AD. Inform extended range cargo carrier and mid to long-term NavWar initiatives to deliver standoff countermeasure effects enabling freedom of operations and employment of precision weapons and munitions in A2/AD environments.				
<b>FY 2021 to FY 2022 Increase/Decrease Statement:</b>				



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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army		<b>Date:</b> May 2021		
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603639A / Tank and Medium Caliber Ammunition	<b>Project (Number/Name)</b> FA5 / Assured Precision Weapons and Munitions		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
Develops physical and virtual prototypes of continued Fires SoS APNT related AS and NavWar virtual prototyping efforts to experiment with standoff NavWar countermeasure effects requiring increased funding and resources. Effort is critical to inform full NavWar strategy for LRPF and AMD to operate in MDO.				
<p><b>Title:</b> Assured PNT related Weapons &amp; Munitions Prototyping - PGM Software-Defined Receiver (SDRx)</p> <p><b>Description:</b> Develop a prototype ?All In One? (Global Positioning System (GPS), Global Navigation Satellite System (GNSS), Alternative Navigation (AltNav), Signals of Opportunity (SoO)) software defined radio frequency Assured Position, Navigation and Timing (A-PNT) receiver for a large portion of the Precision Guided Munition (PGM) portfolio.</p> <p><b>FY 2022 Plans:</b> Develop diverse RF Basic Navigation functions required for a prototype PGM SDRx.</p> <p><b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> Leveraging prior investments by the Aviation community, develop software-based basic navigation functions needed for a smaller prototype SDRx targeted for the PGM Lethality domain.</p>		-	-	6.636
<p><b>Title:</b> Army M-Code Technology Integration and Evaluation</p> <p><b>Description:</b> Provide technical assessment, coordination, and engineering support related to the development, prototyping, integration, and evaluation of Air Force?s MGUE technology deliverables across all Army Weapons and Munitions, including participation in design reviews, testing, evaluation, and formal feedback on technology, component-level, card-level, sub-system-level, and systems-level requirements and performance. Reduce risk, support, and inform M-Code GPS related Army cross-functional modernization decisions for weapons and munitions operating in a peer/near threat SoS environment as well as identifying complementary PNT and related solutions when M-Code GPS is not solely sufficient to enable Combat Overmatch.</p> <p><b>FY 2021 Plans:</b> Lead an Army M-Code GPS Weapons and Munitions IPT and influence the Air Force?s MGUE technology investments via established requirements and performance based needs for Army Weapons and Munitions. Lead a centralized Army evaluation, prototyping, and experimentation mechanism to assess the effectiveness of M-Code GPS focused weapon and munition platform capabilities operating in a peer/near PNT threat system-of-systems environment. Lead a multi-organizational IPT to execute study, analysis, and integration imperatives for the Army M-Code Task Force.</p> <p><b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> See New Title for statement: Army APNT (incl M-Code) and NavWar Technology Integration and Evaluation.</p>		9.022	11.101	-
<b>Title:</b> Army APNT (incl M-Code) and NavWar Technology Integration and Evaluation		-	-	12.403

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army		<b>Date:</b> May 2021		
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603639A / <i>Tank and Medium Caliber Ammunition</i>	<b>Project (Number/Name)</b> FA5 / <i>Assured Precision Weapons and Munitions</i>		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
<p><b>Description:</b> Provide technical assessment, coordination, and engineering support related to the development, prototyping, integration, and evaluation of Air Force's MGUE technology deliverables across all Army Weapons and Munitions, including participation in design reviews, testing, evaluation, and formal feedback on technology, component-level, card-level, sub-system-level, and systems-level requirements and performance. Reduce risk, support, and inform M-Code GPS related Army cross-functional modernization decisions for weapons and munitions operating in a peer/near threat SoS environment as well as identifying complementary PNT and NavWar related solutions when M-Code GPS is not solely sufficient to enable Combat Overmatch.</p> <p><b>FY 2022 Plans:</b> Continue to lead the Army M-Code GPS Weapons and Munitions IPT and influence the Air Force's MGUE technology investments via established requirements and performance based needs for Army Weapons and Munitions. Lead a centralized Army evaluation, prototyping, and experimentation mechanism to assess the effectiveness of M-Code GPS focused weapon and munition platform capabilities as well as emerging NavWar related capabilities operating in a peer/near PNT threat SoS environment. Continue to lead the multi-organizational IPT to execute study, analysis, integration, and migration imperatives for the Army M-Code Task Force. Support high priority Army programs transitioning to M-Code to meet Army modernization objectives.</p> <p><b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> This is not a new work effort, but rather a name change to better reflect a logical extension of technology scope for this ongoing work effort. The evolution of the peer/near-peer threat environment has necessitated extending the focus of this Technology Integration and Evaluation work effort beyond solely M-Code GPS to also encompass the greater APNT domain as well as addressing the impacts of NavWar technologies on Army weapons and munitions.</p> <p>Level of effort required in FY 2022 is slightly higher than FY 2021 due to further maturation of next generation M-Code technology, and initiation of M-Code integration migration for high priority Army platforms to meet force package initiatives and timelines as well as IPT support for emerging NavWar related capabilities.</p>				
<p><b>Title:</b> MGUE Increment 2 (Inc2) with Precision Guidance Kit - Anti Jam (LR PGK)</p> <p><b>Description:</b> Influence next generation MGUE development to ensure precision guided munition needs and requirements are met with the Air Force's next generation MGUE. Integrate and test next generation MGUE into the Long Range Precision Guidance Kit (LR-PGK) as the DoD-selected representative Joint precision munition to verify and validate needs and requirements are met by next generation MGUE.</p> <p><b>FY 2021 Plans:</b></p>		1.023	1.500	-

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army		<b>Date:</b> May 2021		
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603639A / <i>Tank and Medium Caliber Ammunition</i>	<b>Project (Number/Name)</b> FA5 / <i>Assured Precision Weapons and Munitions</i>		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
<p>Perform modeling and simulations on GPS threat scenarios on MGUE designs to assess performance for PGM applications. Perform risk reduction analysis and activities of MGUE vendor designs. Draft Inc2 Next Generation Application Specific Integrated Circuit (ASIC) (NGA) Technology Maturity Assessment (TMA) &amp; Integration Risk Analysis (IRA) Report for PGMs.</p> <p><b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> See New Title for statement: MGUE Inc2 for JROC-directed PGM Lead Platform.</p>				
<p><b>Title:</b> MGUE Inc2 for JROC-directed PGM Lead Platform</p> <p><b>Description:</b> Influence next generation MGUE development to ensure precision guided munition needs and requirements are met with the Air Force's next generation MGUE. Evaluate the next generation MGUE using the Long Range Precision Guidance Kit (LR-PGK) as the DoD-selected representative Joint precision munition to verify and validate PGM needs and requirements are met by next generation MGUE.</p> <p><b>FY 2022 Plans:</b> Perform M&amp;S on GPS threat scenarios on MGUE designs to assess performance for PGM applications. Perform risk reduction analysis and activities of MGUE vendor designs. Draft Inc2 Next Generation Application Specific Integrated Circuit (ASIC) NGA TMA &amp; IRA Report for PGMs.</p> <p><b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> This is not a new work effort, but rather a name change to better reflect the underlying purpose for this ongoing work effort. To ensure precision guided munition needs and requirements are met with the Air Force's next generation MGUE development, DoD selected a representative Joint precision munition lead platform to verify and validate these needs and requirements are met by this next generation MGUE. The DoD selected precision munition lead platform was LR-PGK.</p> <p>Funding and level of effort required in FY 2021 &amp; FY 2022 are the same.</p>		-	-	1.500
<b>Accomplishments/Planned Programs Subtotals</b>		29.981	28.788	43.005
<b>C. Other Program Funding Summary (\$ in Millions)</b>				
N/A				
<b>Remarks</b>				
<b>D. Acquisition Strategy</b>				
Acquisition Strategy: The Assured Precision Weapons and Munitions Project will utilize a combination of Other Transaction Authority (OTA) contract mechanisms such as the Defense Ordinance Technology Consortium (DOTC) OTA and In-House government development and engineering capabilities to obtain prototypes and				

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**Exhibit R-2A, RDT&E Project Justification:** PB 2022 Army **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603639A / <i>Tank and Medium Caliber Ammunition</i>	<b>Project (Number/Name)</b> FA5 / <i>Assured Precision Weapons and Munitions</i>
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demonstrate/evaluate the maturity and integration risk of the M-Code GPS on Precision Munitions and Weapons, as well as other alternative PNT and NavWar related capabilities.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army												Date: May 2021			
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)							
2040 / 4				PE 0603639A / Tank and Medium Caliber Ammunition				FA5 / Assured Precision Weapons and Munitions							
Product Development (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Assured PNT related Weapons Integration Risk Mitigation	MIPR	DoD Ordnance Technology Consortium (DOTC) - TBD,Various : Various	6.850	4.324	Dec 2019	4.310	Dec 2020	-		-		-	0.000	15.484	-
Assured PNT related Weapons Integration Prototyping	MIPR	DoD Ordnance Technology Consortium (DOTC) - TBD, Various : Various	4.000	1.271	Dec 2019	1.000	Dec 2020	-		-		-	0.000	6.271	-
Assured PNT related Munitions Integration Risk Mitigation	MIPR	DoD Ordnance Technology Consortium (DOTC) - TBD,Various : Various	5.000	4.571	Dec 2019	2.786	Dec 2020	-		-		-	0.000	12.357	-
Assured PNT related Munitions Integration Prototyping	MIPR	DoD Ordnance Technology Consortium (DOTC) - TBD,Various : Various	4.000	4.611	Dec 2019	3.175	Dec 2020	5.615	Dec 2021	-		5.615	0.000	17.401	-
Army APNT (incl M-Code) and NavWar Technology Integration and Evaluation	MIPR	Various : Various	-	6.521	Dec 2019	6.101	Dec 2020	7.200	Dec 2021	-		7.200	Continuing	Continuing	Continuing
Weapon & Munitions Prototyping & Integration Risk Mitigation	MIPR	DoD Ordnance Technology Consortium (DOTC) - TBD,Various : Various	-	-		-		16.669	Dec 2021	-		16.669	Continuing	Continuing	Continuing
<b>Subtotal</b>			19.850	21.298		17.372		29.484		-		29.484	Continuing	Continuing	N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army												Date: May 2021			
Appropriation/Budget Activity 2040 / 4				R-1 Program Element (Number/Name) PE 0603639A / Tank and Medium Caliber Ammunition				Project (Number/Name) FA5 / Assured Precision Weapons and Munitions							
Support (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Management	Various	Joint Program Executive Office Armaments and Ammunition (JPEO A&A) : Picatinny Arsenal, NJ	2.182	1.140	Dec 2019	1.275	Dec 2020	1.281	Dec 2021	-		1.281	Continuing	Continuing	Continuing
Assured Precision Weapons and Munitions IPT Support	MIPR	Various : Various	3.947	2.176	Dec 2019	2.341	Dec 2020	2.437	Dec 2021	-		2.437	Continuing	Continuing	Continuing
Army APNT (incl M-Code) and NavWar Technology Integration and Evaluation Support. (Multiple PEO Sup	MIPR	Various : Various	-	-		1.500	Dec 2020	5.203	Dec 2021	-		5.203	Continuing	Continuing	Continuing
Assured Technologies Engineering Support	MIPR	Combat Capability Development Command Armament Center (CCDC AC) : Picatinny Arsenal, NJ	1.492	1.204	Dec 2019	1.100	Dec 2020	2.500	Dec 2021	-		2.500	Continuing	Continuing	Continuing
Assured Technologies Engineering Support	MIPR	Communication Electronics Research,Development and Engineering Center (C5ISR) : Aberdeen Proving Ground, MD	0.800	0.671	Dec 2019	0.200	Dec 2020	0.400	Dec 2021	-		0.400	Continuing	Continuing	Continuing
Assured Technologies Engineering Support	MIPR	Aviation and Missiles Center (AvMC) : Redstone Arsenal, AL	-	-		-		0.200	Dec 2021	-		0.200	0.000	0.200	-
Army M-Code Technology Integration and Evaluation Support	MIPR	Various : Various	-	2.421	Dec 2019	3.500	Dec 2020	-		-		-	0.000	5.921	-

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army** **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603639A / Tank and Medium Caliber Ammunition	<b>Project (Number/Name)</b> FA5 / Assured Precision Weapons and Munitions
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<b>Support (\$ in Millions)</b>				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
MGUE Inc2 for JROC-directed PGM Lead Platform Support	MIPR	Combat Capability Development Command Armament Center (CCDC AC) : Picatinny Arsenal, NJ	-	1.071	Dec 2019	1.500	Dec 2020	1.500	Dec 2021	-		1.500	Continuing	Continuing	Continuing
<b>Subtotal</b>			8.421	8.683		11.416		13.521		-		13.521	Continuing	Continuing	N/A

**Remarks**  
Support consists of labor, travel and other non-labor costs in Fiscal Year (FY) 2022.

	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
<b>Project Cost Totals</b>	28.271	29.981	28.788	43.005	-	43.005	Continuing	Continuing	N/A

**Remarks**

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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2022 Army</b>		<b>Date: May 2021</b>
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603639A / <i>Tank and Medium Caliber Ammunition</i>	<b>Project (Number/Name)</b> FA5 / <i>Assured Precision Weapons and Munitions</i>

Event Name	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Integrated Product Support - Joint Lethality PNT SME WIPT & Pr	[Redacted]																											
W&M Proto & Integration Risk Mitigation - APNT FASCAM Replac	[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]			
W&M Proto & Integration Risk Mitigation - NA2 for Weapons & M	[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]			
W&M Proto & Integration Risk Mitigation - NA2 for Guided RAMS	[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]			
W&M Proto & Integration Risk Mitigation - Fires SoS APNT related AS and NavWar	[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]			
W&M Proto & Integration Risk Mitigation - Next Gen PNT Technologies Phase 1	[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]			
W&M Proto & Integration Risk Mitigation - AltNav Technologies P	[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]			
W&M Proto & Integration Risk Mitigation - Location Azimuth Dete	[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]			
W&M Proto & Integration Risk Mitigation - RAMS PGM M-Code Prototyping	[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]			
W&M Proto & Integration Risk Mitigation - Munition Deployed NavWar CM	[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]			
W&M Proto & Integration Risk Mitigation - PGM SDRx	[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]			
Army APNT (incl M-Code) and NavWar Technology Integration a	[Redacted]																											
MGUE Inc2 for JROC-directed PGM Lead Platform	[Redacted]																											



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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2022 Army</b>			<b>Date: May 2021</b>		
<b>Appropriation/Budget Activity</b> 2040 / 4		<b>R-1 Program Element (Number/Name)</b> PE 0603639A / <i>Tank and Medium Caliber Ammunition</i>		<b>Project (Number/Name)</b> FA5 / <i>Assured Precision Weapons and Munitions</i>	

Event Name	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
W&M Proto & Integration Risk Mitigation - Next Gen NavWar Tech Phase 1																												
W&M Proto & Integration Risk Mitigation - Fires SoS NavWar MDO Phase 1																												
W&M Proto & Integration Risk Mitigation - Next Gen NavWar CM Tech Phase 1																												
W&M Proto & Integration Risk Mitigation - Fires SoS NAVWAR MDO Phase 2																												
W&M Proto & Integration Risk Mitigation - Next Gen PNT Technologies Phase 2																												

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**Exhibit R-4A, RDT&E Schedule Details:** PB 2022 Army **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603639A / <i>Tank and Medium Caliber Ammunition</i>	<b>Project (Number/Name)</b> FA5 / <i>Assured Precision Weapons and Munitions</i>
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**Schedule Details**

Events	Start		End	
	Quarter	Year	Quarter	Year
Integrated Product Support - Joint Lethality PNT SME WIPT & Program Management	1	2017	4	2028
W&M Proto & Integration Risk Mitigation - APNT FASCAM Replacement	1	2019	4	2020
W&M Proto & Integration Risk Mitigation - NA2 for Weapons & Munitions Phase 2	1	2020	4	2021
W&M Proto & Integration Risk Mitigation - NA2 for Guided RAMS	1	2020	4	2021
W&M Proto & Integration Risk Mitigation - Fires SoS APNT related AS and NavWar	1	2021	4	2022
W&M Proto & Integration Risk Mitigation - Next Gen PNT Technologies Phase 1	1	2022	4	2023
W&M Proto & Integration Risk Mitigation - AltNav Technologies Phase 2	1	2020	4	2021
W&M Proto & Integration Risk Mitigation - Location Azimuth Determinations System	1	2020	4	2020
W&M Proto & Integration Risk Mitigation - RAMS PGM M-Code Prototyping	1	2022	4	2022
W&M Proto & Integration Risk Mitigation - Munition Deployed NavWar CM	1	2022	4	2023
W&M Proto & Integration Risk Mitigation ? PGM SDRx	1	2022	4	2022
Army APNT (incl M-Code) and NavWar Technology Integration and Evaluation	1	2020	4	2028
MGUE Inc2 for JROC-directed PGM Lead Platform	1	2020	2	2027
W&M Proto & Integration Risk Mitigation - Next Gen NavWar Tech Phase 1	1	2024	4	2025
W&M Proto & Integration Risk Mitigation - Fires SoS NavWar MDO Phase 1	1	2025	4	2026
W&M Proto & Integration Risk Mitigation - Next Gen NavWar CM Tech Phase 1	1	2027	4	2028
W&M Proto & Integration Risk Mitigation - Fires SoS NAVWAR MDO Phase 2	1	2027	4	2028
W&M Proto & Integration Risk Mitigation - Next Gen PNT Technologies Phase 2	1	2027	4	2028

**Note**

Notes:  
 Positioning, Navigation and Timing (PNT)  
 Subject Matter Expert (SME)  
 Working Integrated Product Team (WIPT)

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603639A / <i>Tank and Medium Caliber Ammunition</i>	<b>Project (Number/Name)</b> FA5 / <i>Assured Precision Weapons and Munitions</i>
Network Assisted (NA) Assured Positioning, Navigation and Timing (APNT)		

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army										<b>Date:</b> May 2021		
<b>Appropriation/Budget Activity</b> 2040 / 4					<b>R-1 Program Element (Number/Name)</b> PE 0603639A / Tank and Medium Caliber Ammunition				<b>Project (Number/Name)</b> FG1 / Cannon-Delivered Area Effects Munitions (C-DAEM)			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022 Base</b>	<b>FY 2022 OCO</b>	<b>FY 2022 Total</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>FY 2026</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
FG1: Cannon-Delivered Area Effects Munitions (C-DAEM)	-	20.564	38.466	-	-	-	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**Note**

In Fiscal Year (FY) 2022, Project FG1, Cannon-Delivered Area Effects Munitions, will transition to Budget Activity 5, Program Element (PE) 0604802A, Weapons and Munitions Engineering Development, Project FJ4, Cannon-Delivered Area Effects Munitions. There is no FY 2022 request for Project FG1.

**A. Mission Description and Budget Item Justification**

The Cannon-Delivered Area Effects Munitions (C-DAEM) Project will provide United States (U.S). ground forces with the capability to engage area personnel through armored targets, while denying threat forces full operational freedom within the targeted area. An Analysis of Alternatives (AoA) was completed in January 2018 to inform Army acquisition and investment decisions regarding replacement of the current stockpile of 155 millimeter (mm) Dual Purpose Improved Conventional Munitions (DPICM) with Department of Defense (DoD) policy compliant munitions and address anti-armor and extended range capability requirements. The Army validated two materiel solutions for C-DAEM to be pursued in parallel. C-DAEM Armor (Increment 1) will destroy moved and moving infantry fighting vehicles, self-propelled howitzers, and tanks. C-DAEM DPICM Replacement (Increment 2) will destroy personnel to light-skinned vehicles. There is no FY 2022 budget request.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
<b>Title:</b> C-DAEM Armor	20.564	38.466	-
<b>Description:</b> C-DAEM Armor will destroy infantry fighting vehicles, self-propelled howitzers, and tanks.			
<b>FY 2021 Plans:</b> FY 2021 funding supports the completion of the C-DAEM Armor competitive demonstration phase which will identify the most promising candidate(s) to support the Army's modernization priorities.			
<b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> Decrease in funding from FY 2021 to FY 2022 due to transition of Cannon-Delivered Area Effects Munitions (C-DAEM) to Budget Activity (BA) 5 Program Element (PE) 0604802A, Project FJ4, C-DAEM.			
<b>Accomplishments/Planned Programs Subtotals</b>	20.564	38.466	-

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army	<b>Date:</b> May 2021
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<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603639A / Tank and Medium Caliber Ammunition	<b>Project (Number/Name)</b> FG1 / Cannon-Delivered Area Effects Munitions (C-DAEM)
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**C. Other Program Funding Summary (\$ in Millions)**

Line Item	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
• FJ4: Cannon-Delivered Area Effects Munitions (C-DAEM)	-	26.593	89.138	-	89.138	-	-	-	-	-	-
• E68603: PROJ, ARTY, 155MM C-DAEM INCREMENT 1	-	-	-	-	-	-	-	-	-	-	-

**Remarks**

In FY 2021, Project FG1 supports C-DAEM Armor efforts. C-DAEM Armor will transition to Budget Activity 05 PE 0604802A Weapons and Munitions - Eng Dev Project FJ4, Cannon-Delivered Area Effects Munitions (C-DAEM), in FY 2022. In FY 2023, C-DAEM Armor will transition to production. A Procurement of Ammunition, Army (PAA) funding line, Standard Study Number (SSN) E68603, PROJ, ARTY, 155MM C-DAEM INCREMENT 1, is established for this effort.

In FY 2021, the C-DAEM DPICM Replacement effort will transition to BA 05 PE 0604802A Weapons and Munitions - Eng Dev Project FJ4, Cannon-Delivered Area Effects Munitions (C-DAEM). A PAA funding line for C-DAEM DPICM Replacement, SSN E68604, PROJ, ARTY, 155MM C-DAEM INCREMENT 2, will be established in FY 2024 for this effort.

**D. Acquisition Strategy**

C-DAEM will employ an evolutionary acquisition approach to efficiently transition the unique ammunition products as they become available. The AoA completed on 31 January 2018 qualified a dramatic enhancement of operational Fires effectiveness, efficiency, and maneuver support when cannon artillery was equipped with a dedicated extended range, anti-armor projectile. The U.S. Government is currently reducing risk by executing prototype testing and evaluation efforts in parallel to decompose the AoA results into selection criteria. C-DAEM will use the selection criteria to sponsor a competitive demonstration for C-DAEM Armor to streamline the acquisition process by leveraging Section 815 of the FY 2016 National Defense Authorization Act (NDAA). C-DAEM will use the Defense Ordnance Technology Consortium (DOTC) Other Transaction Agreement (OTA) to further support the completion of the C-DAEM Armor competitive demonstration phase, in FY 2021, which will inform the Army's cluster munition replacement strategy. Upon completion of the competitive demonstration phase, C-DAEM will proceed to qualification testing of the most promising candidate(s) in accordance with the decisions granted at the Army Requirements Oversight Council (AROC), in April 2018.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army												Date: May 2021			
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)							
2040 / 4				PE 0603639A / Tank and Medium Caliber Ammunition				FG1 / Cannon-Delivered Area Effects Munitions (C-DAEM)							
Management Services (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Management	Various	Office of the Project Manager (PM) Combat Ammunition Systems (CAS) : Picatinny Arsenal, NJ	1.360	1.730	Nov 2019	0.360	Oct 2020	-		-		-	Continuing	Continuing	Continuing
<b>Subtotal</b>			1.360	1.730		0.360		-		-		-	Continuing	Continuing	N/A
Product Development (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Armor TMRR Phase	MIPR	DoD Ordnance Technology Consortium (DOTC) : TBD	3.753	16.622	Apr 2020	31.594	Nov 2020	-		-		-	Continuing	Continuing	Continuing
<b>Subtotal</b>			3.753	16.622		31.594		-		-		-	Continuing	Continuing	N/A
Support (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Armor Engineering Support	MIPR	Combat Capabilities Development Command Armaments Center (CCDC AC) : Picatinny Arsenal, NJ	1.310	1.412	Nov 2019	5.229	Nov 2020	-		-		-	Continuing	Continuing	Continuing
Armor Engineering Support	MIPR	Combat Capabilities Development Command Data Analysis Center (CCDC DAC) : Aberdeen, MD	-	0.106	Apr 2020	-		-		-		-	0.000	0.106	-

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army** **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603639A / Tank and Medium Caliber Ammunition	<b>Project (Number/Name)</b> FG1 / Cannon-Delivered Area Effects Munitions (C-DAEM)
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<b>Support (\$ in Millions)</b>				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Armor Fire Control Software Integration	MIPR	U.S. Army Communications-Electronics Command (CECOM) : Aberdeen, MD	-	-		0.683	Jan 2021	-		-		-	0.000	0.683	-
DPICM Replacement Engineering Support	MIPR	Combat Capabilities Development Command Armaments Center (CCDC AC) : Picatinny Arsenal, NJ	0.250	-		-		-		-		-	0.000	0.250	-
<b>Subtotal</b>			1.560	1.518		5.912		-		-		-	Continuing	Continuing	N/A

<b>Test and Evaluation (\$ in Millions)</b>				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Armor Test Targets	MIPR	Army Test and Evaluation Command (ATEC) - Yuma Proving Grounds : Yuma, AZ	-	0.694	Aug 2020	-		-		-		-	0.000	0.694	-
Armor Testing	MIPR	Army Test & Evaluation Command (ATEC) : Yuma, AZ	-	-		0.600	Apr 2021	-		-		-	Continuing	Continuing	Continuing
<b>Subtotal</b>			-	0.694		0.600		-		-		-	Continuing	Continuing	N/A

	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
<b>Project Cost Totals</b>	6.673	20.564	38.466	-	-	-	Continuing	Continuing	N/A

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<b>Exhibit R-3, RDT&amp;E Project Cost Analysis:</b> PB 2022 Army						<b>Date:</b> May 2021				
<b>Appropriation/Budget Activity</b> 2040 / 4			<b>R-1 Program Element (Number/Name)</b> PE 0603639A / <i>Tank and Medium Caliber Ammunition</i>			<b>Project (Number/Name)</b> FG1 / <i>Cannon-Delivered Area Effects Munitions (C-DAEM)</i>				
	<b>Prior Years</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022 Base</b>	<b>FY 2022 OCO</b>	<b>FY 2022 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>	

Remarks



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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2022 Army</b>			<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603639A / Tank and Medium Caliber Ammunition	<b>Project (Number/Name)</b> FG1 / Cannon-Delivered Area Effects Munitions (C-DAEM)	

Event Name	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026				
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	
BONUS Deliveries (Bridging Strategy)																													
Armor TMRR																													
Armor Preliminary Design Review (PDR)					1 PDR																								
Armor Competitive Demonstration						2 Demo																							
Armor Milestone B							3 MS-B																						
Armor Engineering Manufacturing & Development (EMD)																													
Armor Critical Design Review (CDR)									4 CDR																				
Armor Milestone C																					5 MS-C								
DPICM Replacement Qualification and Testing																													

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603639A / <i>Tank and Medium Caliber Ammunition</i>	<b>Project (Number/Name)</b> FG1 / <i>Cannon-Delivered Area Effects Munitions (C-DAEM)</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
C-DAEM AoA, CDD, MS-A Efforts	1	2018	4	2019
Armor Milestone A	1	2019	1	2019
BONUS Deliveries (Bridging Strategy)	1	2020	4	2022
Armor TMRR	1	2019	4	2021
Armor Preliminary Design Review (PDR)	1	2021	1	2021
Armor Competitive Demonstration	3	2021	3	2021
Armor Milestone B	4	2021	4	2021
Armor Engineering Manufacturing & Development (EMD)	1	2022	4	2024
Armor Critical Design Review (CDR)	2	2022	2	2022
Armor Milestone C	4	2024	4	2024
DPICM Replacement Qualification and Testing	1	2021	4	2023

**Note**

Cannon-Delivered Area Effects Munitions (C-DAEM) Armor will destroy infantry fighting vehicles, self-propelled howitzers, and tanks. C-DAEM Dual Purposed Improved Conventional Munitions (DPICM) Replacement will destroy personnel to light-skinned vehicles. C-DAEM Armor and DPICM Replacement are being developed simultaneously.

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2022 Army **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040: Research, Development, Test & Evaluation, Army / BA 4: Advanced Component Development & Prototypes (ACD&P)					<b>R-1 Program Element (Number/Name)</b> PE 0603645A / Armored System Modernization - Adv Dev							
COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	-	138.300	138.685	170.590	-	170.590	-	-	-	-	-	-
<i>EV7: Combat Vehicle Prototyping</i>	-	138.300	138.685	170.590	-	170.590	-	-	-	-	-	-

**A. Mission Description and Budget Item Justification**

Armored System Modernization Advanced Development provides maturation of emerging S&T and industry technologies for potential integration to ground combat vehicles. The purpose of this Program Element's (PE) funding is to demonstrate new capabilities to meet current and future military needs and to determine integration potential across the Army portfolio of ground combat vehicles by testing and evaluating a variety of technologies.

**B. Program Change Summary (\$ in Millions)**

	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022 Base</u>	<u>FY 2022 OCO</u>	<u>FY 2022 Total</u>
Previous President's Budget	144.234	151.478	172.700	-	172.700
Current President's Budget	138.300	138.685	170.590	-	170.590
Total Adjustments	-5.934	-12.793	-2.110	-	-2.110
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-15.464			
• Congressional Rescissions	-	-			
• Congressional Adds	-	8.200			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-5.934	-5.529			
• Adjustments to Budget Years	-	-	-2.110	-	-2.110

**Congressional Add Details (\$ in Millions, and Includes General Reductions)**

**Project:** EV7: *Combat Vehicle Prototyping*

Congressional Add: *Program increase: Next generation electrified transmission*

	FY 2020	FY 2021
	-	8.200
Congressional Add Subtotals for Project: EV7	-	8.200
Congressional Add Totals for all Projects	-	8.200

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army										<b>Date:</b> May 2021		
<b>Appropriation/Budget Activity</b> 2040 / 4					<b>R-1 Program Element (Number/Name)</b> PE 0603645A / <i>Armored System Modernization - Adv Dev</i>				<b>Project (Number/Name)</b> EV7 / <i>Combat Vehicle Prototyping</i>			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022 Base</b>	<b>FY 2022 OCO</b>	<b>FY 2022 Total</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>FY 2026</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
<i>EV7: Combat Vehicle Prototyping</i>	-	138.300	138.685	170.590	-	170.590	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

Armored System Modernization Advanced Development will continue the maturation of emerging ground combat vehicle capabilities to provide a bridge from S&T investment to vehicle platform, informing requirements through User Evaluations, identification of capability gaps and reduction of integration risks. The funding will support virtual and physical concept development, trade studies, technical and operational analyses to assess future concepts and designs. This would also include the support for survivability, lethality and other soldier defined system requirements. In addition, this funding will support program management, system integration labs, integration risk reduction, maturation, testing and assessment of various ground combat vehicles technologies.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
<b>Title:</b> Government Engineering & Program Management	8.458	15.162	8.097
<b>Description:</b> This effort will support Program Management Office (PMO) support that will cover the costs of government and direct support contractor labor, travel, training, supplies, equipment and facilities to manage the experimental prototyping projects.			
<b>FY 2021 Plans:</b> This funding will support Government program management that will cover the costs of government and direct support contractor labor, travel, training, supplies, equipment and facilities to manage the experimental prototyping program as well as the Program Management Office (PMO). This funding will be allocated for Mission Enabled Technology - Demonstrator (MET-D) Phase II and III, Combat Capabilities Development Command (CCDC) Command, Control, Communications, Computers, Combat Systems, Intelligence, Surveillance, and Reconnaissance (C5ISR) Phase II & Phase III technology maturation, CCDC Armaments center technology qualification, and other program management support offices. It will fund the management of the experimental prototyping program, continued technology maturation, and software and data architecture. This effort will include management of MET-D Phase II during Shakedown testing, Army Test and Evaluation Command (ATEC) Safety Evaluation, and the Soldier Operational Experiment and MET-D Phase III cost and schedule as the project progresses through the design phase and into the build phase.			
<b>FY 2022 Plans:</b> This funding will be allocated for the program management support for Advanced Combat Powertrain, Advanced Combat Vehicle Concepts and Studies, Aided Target Recognition (AiTR), MET-D, and Bradley Hybrid Electric Vehicle (BHEV), XM913 and other			

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army		<b>Date:</b> May 2021		
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603645A / <i>Armored System Modernization - Adv Dev</i>	<b>Project (Number/Name)</b> EV7 / <i>Combat Vehicle Prototyping</i>		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
<p>combat vehicle technology advancement efforts. It will fund the management and support costs of experimental prototyping projects, continued technology maturation, and applicable software and data architecture updates.</p> <p><b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> The decrease cost from Fiscal Year (FY) 2021 to FY 2022 is due to allocating engineering efforts to the appropriate Research Development Technology &amp; Evaluation (RDT&amp;E) category.</p>				
<p><b>Title:</b> Developmental Engineering</p> <p><b>Description:</b> Efforts will include the continued development and maturation of advanced technology concepts for ground combat vehicles and related support equipment.</p> <p><b>FY 2022 Plans:</b> This funding for the Ground Vehicle Systems Center (GVSC) will mature the Advanced Combat Engine (ACE) and the Advanced Combat Transmission (ACT) to be ready for production at the end of FY24. A potential target for this effort is the Optionally Manned Fighting Vehicle (OMFV) and other combat vehicle platforms.</p> <p>This funding continues the work to develop the hybrid electric vehicle based on a Bradley platform. The contractor will build, integrate and test a Bradley with components that make up a Hybrid Electric Vehicle. The benefit to the Warfighter is that this will improve survivability by reducing thermal and acoustic signature, provides acceleration, improves lethality, more onboard power for energy based-capabilities such as High Energy Lasers, improved operational endurance/fuel efficiency to start.</p> <p>Other efforts include but are not limited to Advanced Combat Vehicle Concepts and Studies, Aided Target Recognition (AiTR), MET-D and other combat vehicle technology advancement efforts.</p> <p><b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> The increase from FY 2021 to FY 2022 is due transferring these efforts under the appropriate RDTE category rather than the subsystem level, along with increased level of development activities related to Advanced Combat Powertrain, Advanced Combat Vehicle Concepts and Studies, Aided Target Recognition (AiTR) , MET-D, and Bradley Hybrid Electric Vehicle (BHEV) and other combat vehicle technology advancement efforts.</p>		-	-	85.456
<p><b>Title:</b> Test &amp; Evaluation</p> <p><b>Description:</b> Test and Evaluation (T&amp;E) activities include contractor and government testing of prototype vehicles and technologies as well as user evaluations. Testing will be conducted using United States Army test facilities.</p> <p><b>FY 2021 Plans:</b></p>		1.388	13.364	40.358

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army		<b>Date:</b> May 2021		
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603645A / <i>Armored System Modernization - Adv Dev</i>	<b>Project (Number/Name)</b> EV7 / <i>Combat Vehicle Prototyping</i>		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
<p>The T&amp;E funding will prepare, coordinate, and conduct test and evaluation activities with ATEC for MET-D Phase II Safety Testing to include MET-D Phase II Company-Level Soldier Operational Experiment (SOE). This funding will further develop the MET-D Phase III TEMP and test procedures to support Phase III integration, safety, and demonstration testing. C5ISR will conduct comprehensive and enhanced fabrication, integration, analyst and test and evaluation events along with CCDC conducting qualification testing for survivability and lethality requirements.</p> <p><b>FY 2022 Plans:</b> T&amp;E efforts include but are not limited to: Advanced Combat Vehicle Concepts and Studies, Bradley Hybrid Electric Vehicle, MET-D, Next Generation Fire Control (NGFC) Technologies, Vehicle Protection Technology Demonstrator, XM913 and other emerging combat vehicle technology advancements.</p> <p><b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> The increase from FY 2021 to FY 2022 is due reallocating efforts under the appropriate RDTE categories, along with increased level of test and evaluation activities related to Advanced Combat Vehicle Concepts and Studies, Bradley Hybrid Electric Vehicle, MET-D, Next Generation Fire Control (NGFC) Technologies, Vehicle Protection Technology Demonstrator, XM913 and other emerging combat vehicle technology advancements.</p>				
<p><b>Title:</b> Modeling &amp; Simulation</p> <p><b>Description:</b> Modeling and simulation efforts will allow for the ability to experiment in a virtual environment. Support will include reviewing studies conducted and determining any significant issues, areas of concern or potential differences to aid in decision making. The results will provide the analytical underpinnings to support development of requirements.</p> <p><b>FY 2021 Plans:</b> The continued modeling and simulation efforts will produce the ability to experiment in a virtual environment to conduct data collection and results that will inform the physical testing desires of the Soldier Operational Experiments (SOE).The update of models from MET-D Phase II technologies are identified for integration into Phase III will be used to conduct analysis prior to integration in order to inform performance characteristics and identify potential integration challenges. Soldier virtual experiments will be conducted with Phase III technology configuration in conjunction with the Robotic Combat Vehicle (RCV) to determine any Manned Un-Manned Teaming (MUM-T) areas of concern that should be addressed prior to execution of the Phase III SOE.</p> <p><b>FY 2022 Plans:</b> Government support needed for MET-D Phase II for platform assessment thru modeling and analysis, conduct trade studies, and the ability to assess the platform in a virtual environments to aide in decision making.</p> <p><b>FY 2021 to FY 2022 Increase/Decrease Statement:</b></p>		3.268	7.407	0.388

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army		<b>Date:</b> May 2021		
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603645A / <i>Armored System Modernization - Adv Dev</i>	<b>Project (Number/Name)</b> EV7 / <i>Combat Vehicle Prototyping</i>		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
The decrease in cost from FY 2021 to FY 2022 is due to completion of the majority of MET-D Phase II M&S efforts.				
<p><b>Title:</b> Experimental Prototyping</p> <p><b>Description:</b> Experimental prototyping allows for maturation of emerging S&amp;T and industry technologies. This includes XM913, Advanced Combat Powertrain, Advanced Combat Vehicle Concepts and Studies, Advanced Lightweight Track, High Voltage Power Controller, MET-D Phase II, Vehicle Protection Technology Demonstrator and Other Technology Advancements.</p> <p>Experimentation will inform requirements, identify mitigations for capability gaps and reduce technology integration risks.</p> <p><b>FY 2021 Plans:</b> This funding will deliver MET-D experimental prototypes in FY 2023. The MET-D efforts will continue system level prototype development and integration; maintain existing system level software; and develop software upgrades based on results from previous MET-D Experimentation. The system software upgrades will support integration of advanced technologies, improvements for MUM-T, additional autonomous behaviors, improvements in electrical power and network architecture, advancements in slip ring technologies, and enhancements to CCDC C5ISR technologies. This funding will also support the development of technologies to include but not limited to; unmanned turret, Unmanned Aircraft Systems (UAS) and Unmanned Ground Systems (UAS/UGS) target feed, 3D printing, suspension/track, Pre Shot/Laser warning, Aided Target Recognition, Modular Active Protection System (MAPS), 50mm MCAS, and hybrid electric power, that will be integrated onto the Optionally Manned Fighting Vehicle (OMFV) and other legacy platforms/vehicles.</p> <p><b>FY 2022 Plans:</b> This funding will support prototype builds for the following technologies: XM913, Advanced Combat Powertrain, Advanced Combat Vehicle Concepts and Studies, Advanced Lightweight Track, High Voltage Power Controller, MET-D Phase II, Vehicle Protection Technology Demonstrator and Other Technology Advancements.</p> <p><b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> The increase in funding from FY 2021 to FY 2022 is due to the increase in the level of efforts for experimental prototyping and advanced technologies.</p>		124.278	31.508	36.291
<p><b>Title:</b> Powertrain Maturation</p> <p><b>Description:</b> This effort will emphasize improving the Advanced Combat Engine (ACE) and the Advanced Combat Transmission (ACT) subsystem maturity and reduce engine and transmission cost and manufacturing time. The Ground Vehicle Systems Center (GVSC) will conduct maturation and demonstration activities to expedite technology transition from laboratory to operational use and prepare for low rate initial production of the advanced combat engine and transmission. This effort will conduct the evaluation of reliability, maintainability, and logistical analyses necessary to transition to a vehicle platform and conduct maturation to the</p>		0.908	4.000	-

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army		<b>Date:</b> May 2021		
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603645A / <i>Armored System Modernization - Adv Dev</i>	<b>Project (Number/Name)</b> EV7 / <i>Combat Vehicle Prototyping</i>		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
<p>components as a result of these evaluations. The ACE may increase Power Density, increase efficiency (&gt; 48%), and decrease heat rejection (&gt; 20%). The ACT will have advanced Multi-Speed Transmissions and be adaptable to a wide range of engine input speeds, flexible design configuration and packaging, high efficiency geared steering system and &gt; 90% efficiency in all gears.</p> <p><b>FY 2021 Plans:</b> Focus is on the manufacturability of the design which includes replacing expensive custom subcomponents with mass produced hardware and improving the assembly process to use more automation and create less waste. These efforts will result in iterative engine and transmission prototypes that require performance and durability testing to ensure they can be integrated while maintaining their performance capabilities. These will be the foundation for the reliability, maintainability, and logistical analyses necessary to transition to a vehicle platform.</p> <p><b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> The decrease from FY 2021 to FY 2022 is due reallocating these efforts under the appropriate RDTE category rather than the subsystem level.</p>				
<p><b>Title:</b> Other support &amp; technology costs</p> <p><b>Description:</b> This effort from the Ground Vehicle Systems Center is to support the Optionally Manned Tank and various technology sprints.</p> <p><b>FY 2021 Plans:</b> Based on feedback from the MET-D Phase II Experiment and advancements in technology, MET-D Phase III will also develop and update software, crew station training simulators, and software test benches in order to represent the new integrated system functionality prior to physical integration for Phase III. The efforts include but are not limited to, maturing and experimenting with Manned Un-Manned Teaming in conjunction with the Robotic Combat Vehicle, and maturing, integrating and experimenting with a variety of technologies for the OMFV and other legacy combat vehicles/platforms within the Maneuver portfolio. This effort also includes the CCDC C5ISR Army mission command software maturation, architecture maturation, technical and operational analytical studies, and mission targeting support software and algorithms. The CCDC Armaments center will also conduct technology maturation and qualification of survivability and lethality requirements. The funding will support other efforts such as the development of the XM-913 development/qualification and the development of the ammunition.</p> <p><b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> The decrease from FY 2021 to FY 2022 is due reallocating these efforts under the appropriate RDTE category rather than the subsystem level.</p>		-	59.044	-
<b>Accomplishments/Planned Programs Subtotals</b>		138.300	130.485	170.590



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**Exhibit R-2A, RDT&E Project Justification:** PB 2022 Army **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603645A / <i>Armored System Modernization - Adv Dev</i>	<b>Project (Number/Name)</b> EV7 / <i>Combat Vehicle Prototyping</i>
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	FY 2020	FY 2021
<b>Congressional Add:</b> Program increase: Next generation electrified transmission	-	8.200
<b>FY 2021 Plans:</b> Working though Cummins-Allison Transmission to accelerate the development and address the technical challenges of an electrified transmission in a combat vehicle, including maturing subsystem development, vehicle level integration, and demonstration through government testing.		
<b>Congressional Adds Subtotals</b>	-	8.200

**C. Other Program Funding Summary (\$ in Millions)**

N/A

**Remarks**

**D. Acquisition Strategy**

These level of efforts provide the focused investment for the development and demonstration of technology and prototyping for future combat vehicles in the battlefield. The purpose of this funding is to integrate the next generation of technology enabled capabilities developed in the S&T portfolio to demonstrate new capabilities to meet emerging military needs, provide hardware for Soldier operational evaluation/feedback, to determine integration potential across the current Army portfolio of ground vehicles and to develop platform level prototypes.

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<b>Exhibit R-3, RDT&amp;E Project Cost Analysis: PB 2022 Army</b>											<b>Date: May 2021</b>				
<b>Appropriation/Budget Activity</b> 2040 / 4						<b>R-1 Program Element (Number/Name)</b> PE 0603645A / Armored System Modernization - Adv Dev					<b>Project (Number/Name)</b> EV7 / Combat Vehicle Prototyping				

<b>Product Development (\$ in Millions)</b>				<b>FY 2020</b>		<b>FY 2021</b>		<b>FY 2022 Base</b>		<b>FY 2022 OCO</b>		<b>FY 2022 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>			
NGCV Contract(s)	C/Various	Various : Various	36.925	44.583	Mar 2020	-		-		-		-	0.000	81.508	-
Prototyping with Industry	C/Various	Various : Various	15.324	79.695	Feb 2020	-		-		-		-	0.000	95.019	-
Powertrain Maturation	Various	Various : Various	-	0.908	Jul 2020	4.000	Jul 2021	-		-		-	Continuing	Continuing	Continuing
Other support & technology costs	Various	Various : Various	-	-		59.044	Jul 2021	-		-		-	Continuing	Continuing	Continuing
Experimental Prototyping	Various	Various : Various	-	-		31.508	Jul 2021	36.291	Jun 2022	-		36.291	Continuing	Continuing	Continuing
Next Generation Electrified Transmission	Various	Various : Various	-	-		8.200	Aug 2021	-		-		-	0.000	8.200	-
Developmental Engineering	Various	Various : Various	-	-		-		85.456		-		85.456	0.000	85.456	-
<b>Subtotal</b>			52.249	125.186		102.752		121.747		-		121.747	Continuing	Continuing	N/A

**Remarks**

Program decrease experimental prototyping costs by \$15,464K in FY21.  
Congressional add \$8,200K for Next Generation Electrified Transmission in FY21.

<b>Support (\$ in Millions)</b>				<b>FY 2020</b>		<b>FY 2021</b>		<b>FY 2022 Base</b>		<b>FY 2022 OCO</b>		<b>FY 2022 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>			
Program Management	MIPR	PM/PEO : Warren, MI	32.240	8.458	Jan 2020	15.162	Jan 2021	8.097	Jan 2022	-		8.097	Continuing	Continuing	Continuing
<b>Subtotal</b>			32.240	8.458		15.162		8.097		-		8.097	Continuing	Continuing	N/A

<b>Test and Evaluation (\$ in Millions)</b>				<b>FY 2020</b>		<b>FY 2021</b>		<b>FY 2022 Base</b>		<b>FY 2022 OCO</b>		<b>FY 2022 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>			
Modeling & Simulation	MIPR	Various : Various	4.834	3.268	Mar 2020	7.407		0.388		-		0.388	Continuing	Continuing	Continuing
Test & Evaluation	MIPR	Various : Various	8.000	1.388	Jun 2020	13.364		40.358		-		40.358	Continuing	Continuing	-
<b>Subtotal</b>			12.834	4.656		20.771		40.746		-		40.746	Continuing	Continuing	N/A



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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2022 Army</b>		<b>Date: May 2021</b>
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603645A / Armored System Modernization - Adv Dev	<b>Project (Number/Name)</b> EV7 / Combat Vehicle Prototyping

Event Name	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
MET-D Phase 1 Testing	[Redacted]																											
MET-D Phase 2 Design	[Redacted]																											
MET-D Phase 2 Build	[Redacted]																											
MET-D Phase 2 Testing									[Redacted]																			
MET-D Phase 2 SOE finish													1															
MET-D Phase 2 Project finish																	2											
XM913 Weapon Improvements and TDP Development					[Redacted]				[Redacted]				[Redacted]															
XM913 Weapon Testing					[Redacted]				[Redacted]				[Redacted]															
Advanced Combat Powertrain	[Redacted]				[Redacted]				[Redacted]				[Redacted]															
Bradley Hybrid Electric Vehicle (BHEV) Development and Prototype Build	[Redacted]				[Redacted]				[Redacted]				[Redacted]															
Bradley Hybrid Electric Vehicle (BHEV) Testing					[Redacted]				[Redacted]				[Redacted]															
Advanced Lightweight Track Development									[Redacted]				[Redacted]															
Advanced Lightweight Track Testing									[Redacted]				[Redacted]															

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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2022 Army</b>			<b>Date: May 2021</b>
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603645A / Armored System Modernization - Adv Dev	<b>Project (Number/Name)</b> EV7 / Combat Vehicle Prototyping	

Event Name	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Advanced Combat Vehicle Concepts and Studies					[Redacted]				[Redacted]				[Redacted]															
High Voltage Power Controller Prototype					[Redacted]				[Redacted]				[Redacted]															
High Voltage Power Controller Testing					[Redacted]				[Redacted]				[Redacted]															

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603645A / Armored System Modernization - Adv Dev	<b>Project (Number/Name)</b> EV7 / Combat Vehicle Prototyping

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
MET-D Phase 1 Testing	4	2019	2	2020
MET-D Phase 2 Design	1	2020	3	2020
MET-D Phase 2 Build	2	2020	2	2021
MET-D Phase 2 Testing	4	2021	3	2022
MET-D Phase 2 SOE finish	4	2022	4	2022
MET-D Phase 2 Project finish	1	2023	1	2023
XM913 Weapon Improvements and TDP Development	4	2020	3	2023
XM913 Weapon Testing	4	2020	3	2023
Advanced Combat Powertrain	1	2020	4	2023
Bradley Hybrid Electric Vehicle (BHEV) Development and Prototype Build	3	2020	3	2022
Bradley Hybrid Electric Vehicle (BHEV) Testing	4	2020	4	2022
Advanced Lightweight Track Development	4	2021	4	2022
Advanced Lightweight Track Testing	4	2021	1	2022
Advanced Combat Vehicle Concepts and Studies	2	2021	3	2023
High Voltage Power Controller Prototype	2	2021	2	2022
High Voltage Power Controller Testing	3	2021	2	2022

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2022 Army **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040: <i>Research, Development, Test &amp; Evaluation, Army / BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0603747A / <i>Soldier Support and Survivability</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	-	9.246	5.712	2.897	-	2.897	-	-	-	-	-	-
610: <i>Food Adv Development</i>	-	3.568	3.028	2.897	-	2.897	-	-	-	-	-	-
C08: <i>Rapid Equipping Force</i>	-	5.678	2.684	-	-	-	-	-	-	-	-	-

**A. Mission Description and Budget Item Justification**

This Program Element (PE) supports component development and prototyping for organizational equipment, improved individual clothing and equipment that enhance Soldier battlefield effectiveness, survivability, and sustainment. This PE also supports the component development and prototyping of joint service food and combat feeding equipment designed to reduce logistics burden.

**B. Program Change Summary (\$ in Millions)**

	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022 Base</u>	<u>FY 2022 OCO</u>	<u>FY 2022 Total</u>
Previous President's Budget	9.514	5.841	5.954	-	5.954
Current President's Budget	9.246	5.712	2.897	-	2.897
Total Adjustments	-0.268	-0.129	-3.057	-	-3.057
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.268	-0.129			
• Adjustments to Budget Years	-	-	-3.057	-	-3.057

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army										<b>Date:</b> May 2021		
<b>Appropriation/Budget Activity</b> 2040 / 4					<b>R-1 Program Element (Number/Name)</b> PE 0603747A / <i>Soldier Support and Survivability</i>				<b>Project (Number/Name)</b> 610 / <i>Food Adv Development</i>			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022 Base</b>	<b>FY 2022 OCO</b>	<b>FY 2022 Total</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>FY 2026</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
610: <i>Food Adv Development</i>	-	3.568	3.028	2.897	-	2.897	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

This Project provides for the advanced component development and prototyping of Joint Service combat ration components/platforms and field feeding equipment designed to improve warfighter performance and reduce the logistics burden of subsistence support. Efforts funded in this Project support all four Services, the Special Operations Command, and the Defense Logistics Agency. The Army serves as the Executive Agent for this Department of Defense (DoD) program, with oversight and coordination provided by the DoD Combat Feeding Research and Engineering Board as required by DoD Directive (DoDD) 3235.02E. Centralized execution of the DoD Combat Feeding Research and Engineering Program (CFREP) with Joint Service review and approval eliminates unnecessary duplication of efforts across the Services and maximizes use of common materiel solutions. Prototypes validated within this effort transition to 0604713A/Project 548 for System Development and Demonstration.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
<b>Title:</b> Joint Service Combat Ration Advanced Development	2.415	1.636	1.564
<b>Description:</b> This effort matures and integrates combat ration technologies and prototypes that enable warfighter maneuver, readiness and effectiveness during highly mobile, dispersed operations. Technologies are transitioned from RDTE Budget Activity 3 projects to provide individual and group combat rations and components with improved capabilities including improved warfighter physical and cognitive performance through optimized nutrition and a reduced logistics burden through weight and cube reduction.			
<b>FY 2021 Plans:</b> Continue to validate and integrate S&T innovations and COTS/NDI candidate items into existing ration platforms to increase operational effectiveness; conduct T&E of technologies for integration into prototype Expeditionary Group Rations (EGRs) to decrease the logistics burden and enable group feeding in austere environments; conduct T&E of non-destructive sampling technologies to meet Defense Health Agency Veterinary Services requirements for rapid detection of contaminants in food; and transition validated prototypes to PE 0604713A/Project 548 for operational testing and evaluation (OT&E).			
<b>FY 2022 Plans:</b> Will continue to validate and integrate S&T innovations and COTS/NDI candidate items into existing ration platforms to increase operational effectiveness; will conduct T&E of technologies for integration into 2nd iteration of the Close Combat Assault Ration (CCAR) as well as prototype EGRs to decrease the logistics burden and enable group feeding in austere environments; will conduct T&E of non-destructive sampling technologies to meet DHA Veterinary Services requirements for rapid detection of contaminants in food; and transition validated prototypes to PE 0604713A/Project 548 for operational testing and evaluation			
<b>FY 2021 to FY 2022 Increase/Decrease Statement:</b>			



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**Exhibit R-2A, RDT&E Project Justification:** PB 2022 Army **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603747A / <i>Soldier Support and Survivability</i>	<b>Project (Number/Name)</b> 610 / <i>Food Adv Development</i>
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<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	FY 2020	FY 2021	FY 2022
Decrease reflects inflation adjustment and decrement in support of higher Army priorities.			
<b>Title:</b> Joint Service Field Feeding Equipment and Menu Development	1.153	1.392	1.333
<b>Description:</b> This effort matures and integrates field feeding equipment technologies and prototypes in support of the Navy, Air Force, and Marine Corps that reduce the logistics burden, improve efficiency, and decrease operation and support costs as directed by the DoD CFREB. This effort also conducts test and evaluation (T&E) on Navy Standard Core Menu components and preparation techniques to enhance efficiency through standardization across the fleet and reduce labor requirements.			
<b>FY 2021 Plans:</b> Will conduct T&E of energy conservation technologies for USAF BEAR kitchens; will conduct T&E of upgrades to or new developments for expeditionary field kitchens for use by deployed units in austere environments; will continue to conduct T&E of new products and food preparation techniques to enhance menu acceptance and reduce labor requirements; and will transition prototypes to PE 0604713A/Project 548 for operational test and evaluation (OT&E).			
<b>FY 2022 Plans:</b> Will continue T&E of energy conservation and other self-diagnostic technologies for USAF BEAR and other field kitchens; will continue T&E of upgrades to or new developments for Expeditionary Field Kitchens (EFKs) for use by deployed units in austere environments; will continue to conduct T&E of new products and food preparation techniques to enhance menu acceptance and reduce labor requirements; and will transition prototypes to PE 0604713A/Project 548 for OT&E.			
<b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> Decrease reflects inflation adjustment and decrement in support of higher Army priorities.			
<b>Accomplishments/Planned Programs Subtotals</b>	3.568	3.028	2.897

<b>C. Other Program Funding Summary (\$ in Millions)</b>											
<u>Line Item</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2022</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>FY 2026</u>	<u>Cost To Complete</u>	<u>Total Cost</u>
			<u>Base</u>	<u>OCO</u>	<u>Total</u>						
• 548: <i>Mil Subsistence Sys</i>	2.295	2.734	1.658	-	1.658	-	-	-	-	-	-

**Remarks**

**D. Acquisition Strategy**  
Validated prototypes will transition to System Development and Demonstration for operational test and evaluation.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army												Date: May 2021				
Appropriation/Budget Activity				R-1 Program Element (Number/Name)						Project (Number/Name)						
2040 / 4				PE 0603747A / Soldier Support and Survivability						610 / Food Adv Development						
<b>Management Services (\$ in Millions)</b>				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total				
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract	
Combat Feeding Program Management	Allot	CCDC Soldier Center, Natick, MA : Natick, MA	7.492	0.287	Oct 2019	0.319	Oct 2020	0.333	Oct 2021	-		0.333	Continuing	Continuing	Continuing	
DLA Bill Pay (ABO Placeholder)	TBD	Various : Various	2.136	-		-		-		-		-	0.000	2.136	-	
<b>Subtotal</b>			9.628	0.287		0.319		0.333		-		0.333	Continuing	Continuing	N/A	
<b>Product Development (\$ in Millions)</b>				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total				
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract	
Joint Service Rations and Combat Feeding Equipment	Various	Various : Various	38.556	3.281	Oct 2019	2.427	Oct 2020	2.273	Oct 2021	-		2.273	Continuing	Continuing	Continuing	
<b>Subtotal</b>			38.556	3.281		2.427		2.273		-		2.273	Continuing	Continuing	N/A	
<b>Test and Evaluation (\$ in Millions)</b>				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total				
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract	
Joint Service Rations and Combat Feeding Equipment	Allot	CCDC Soldier Center, Natick, MA : Natick, MA	1.289	-		0.282	Oct 2020	0.291	Oct 2021	-		0.291	Continuing	Continuing	Continuing	
<b>Subtotal</b>			1.289	-		0.282		0.291		-		0.291	Continuing	Continuing	N/A	
<b>Project Cost Totals</b>			49.473	3.568		3.028		2.897		-		2.897	Continuing	Continuing	N/A	
<b>Remarks</b>																

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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2022 Army</b>		<b>Date: May 2021</b>
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603747A / <i>Soldier Support and Survivability</i>	<b>Project (Number/Name)</b> 610 / <i>Food Adv Development</i>

Event Name	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Evaluate individual and group ration enhancements and transition to SDD for OT&E																												
Conduct in-house T&E of CCAR and transition to SDD for OT&E																												
Conduct in-house T&E of optimized MRE and FSR w/ candidate																												
Conduct in-house T&E of OPRATS with improved lipid quality & transition to TDPs																												
Conduct in-house T&E of EGR and transition to SDD for OT&E																												
Conduct I-H T&E of non-destructive sampling technologies for food contamination																												
Provide USN w/CPI, evaluations and menu development to support SDD for OT&E																												
ID and evaluate advanced galley/scullery equipment for the USN																												
Conduct T&E of Galley/Scullery equipment and transition to SDD for OT&E																												
Conduct in-house T&E of JIMKE intuitive equipment and transition to SDD for OT&E																												
Conduct T&E on rapidly deployable refrigeration prototype																												
Conduct in-house T&E of mobile feeding galley and transition to SDD for OT&E																												
Award contract to fabricate IRefS prototype and conduct in-house T&E																												

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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2022 Army</b>			<b>Date: May 2021</b>
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603747A / <i>Soldier Support and Survivability</i>	<b>Project (Number/Name)</b> 610 / <i>Food Adv Development</i>	

Event Name	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Conduct in-house T&E of energy conservation technologies for																												
Conduct in-house T&E of EFK upgrades for USMC																												
Conduct in-house T&E of expeditionary kitchen systems for sho																												

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<b>Exhibit R-4A, RDT&amp;E Schedule Details: PB 2022 Army</b>		<b>Date: May 2021</b>
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603747A / <i>Soldier Support and Survivability</i>	<b>Project (Number/Name)</b> 610 / <i>Food Adv Development</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Evaluate individual and group ration enhancements and transition to SDD for OT&E	1	2017	4	2026
Conduct in-house T&E of CCAR and transition to SDD for OT&E	1	2019	4	2020
Conduct in-house T&E of optimized MRE and FSR w/ candidate CCAR components	1	2020	4	2020
Conduct in-house T&E of OPRATS with improved lipid quality & transition to TDPs	1	2022	4	2022
Conduct in-house T&E of EGR and transition to SDD for OT&E	1	2020	4	2022
Conduct I-H T&E of non-destructive sampling technologies for food contamination	1	2021	4	2022
Provide USN w/CPI, evaluations and menu development to support NSCM upgrades	1	2017	4	2026
ID and evaluate advanced galley/scullery equipment for the USN	1	2017	4	2021
Conduct T&E of Galley/Scullery equipment and transition to SDD for OT&E	1	2017	4	2021
Conduct in-house T&E of JSERCS prototype for BEAR Type I kitchen for USAF	1	2017	1	2018
Identify and procure JIMKE prototypes	1	2018	2	2019
Conduct in-house T&E of JIMKE intuitive equipment and transition to SDD for OT&E	2	2019	4	2020
Conduct T&E on rapidly deployable refrigeration prototype	1	2020	4	2020
Award contract for build of prototype mobile galley feeding system for USN	1	2018	1	2019
Conduct in-house T&E of mobile feeding galley and transition to SDD for OT&E	1	2019	1	2020
Award contract to fabricate IRefS prototype and conduct in-house T&E	1	2019	4	2020
Conduct in-house T&E of energy conservation technologies for BEAR Kitchens	1	2020	4	2022
Conduct in-house T&E of EFK upgrades for USMC	1	2022	4	2024
Conduct in-house T&E of expeditionary kitchen systems for shore-based Navy units	1	2020	4	2021

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**Exhibit R-2A, RDT&E Project Justification:** PB 2022 Army **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603747A / <i>Soldier Support and Survivability</i>	<b>Project (Number/Name)</b> C08 / <i>Rapid Equipping Force</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
<i>C08: Rapid Equipping Force</i>	-	5.678	2.684	-	-	-	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

**Note**

Equipment mix and configuration may change based on changes in operational environment and circumstances.

**A. Mission Description and Budget Item Justification**

The REF has no FY22 RDTE funding request due to closure and discontinuation at the end of FY21, dated 30 Sep 2020, subject: HQDA EXORD 233-20 Discontinuation of the Rapid Equipping Force.

The REF is the Army's Quick Reaction Capability (QRC) with the ability to acquire, integrate and sustain Commercial-Off-The Shelf (COTS), Government Off-The-Shelf (GOTS), Non-Developmental Item (NDI), and Non-Standard Equipment (NSE) solutions to meet urgent combat requirements for globally employed forces. It inserts selected future force technologies, capabilities, and surrogate materiel solutions into deployed, deploying, select-prepared to deploy, and transformational forces for operational evaluation, assessment, and evolutionary development. The REF assesses the provided capabilities to improve future solutions to inform materiel development for the future Army capability requirements and to potentially transition the capability to an Army acquisition program.

The REF is an enduring organization (Base funded) per Memorandum, Under Secretary of the Army, 30 Jan 2014, subject: Implementation Plan for Stabilization of the Rapid Equipping Force (REF).

The REF bridges the gap between the Army's traditional acquisition process and immediate equipping needs. The REF pursues tangible solutions that can be equipped rapidly with a goal of 180 days. The REF focuses on finding immediate and effective game-changing capabilities to increase Soldier Readiness, effectiveness, protection, and lethality in any operational environment. The REF 10-Liner process provides the ability to react quickly to an ever-changing enemy who changes in days and months, not years in a complex world. The REF coordinates with the Combatant Command (COCOMs) and Army Service Component Command (ASCCs) in theater to fully understand their urgent needs, for which the REF acquisition capability may identify, procure, deliver, and sustain solutions to the deployed units. Although the REF works directly with Operational Commanders at all levels, it focuses on Brigade level and below to equip solutions to identified capability gaps.

The Army Acquisition Executive designated Program Executive Office (PEO) Soldier as the Milestone Decision Authority (MDA) to institutionalize the acquisition authorities in support of the REF and to provide proper acquisition oversight while enhancing visibility of these efforts. The MDA will ensure flexibility and speed focused on the Soldier's needs serviced by the dedicated REF Program Management Office (PMO). This establishes a formal acquisition reporting chain that leverages existing reporting venues to ensure appropriate Assistant Secretary of the Army (Acquisition, Logistics and Technology) (ASA(ALT)) visibility, oversight, and direction.

The REF capabilities cross all Warfighter Functions:

1. Mission Command

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**Exhibit R-2A, RDT&E Project Justification:** PB 2022 Army **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603747A / <i>Soldier Support and Survivability</i>	<b>Project (Number/Name)</b> C08 / <i>Rapid Equipping Force</i>
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- 2. Movement and Maneuver
- 3. Intelligence
- 4. Fires
- 5. Sustainment
- 6. Protection

The RDT&E funding also provides the REF the flexibility to invest in near-term, and innovative solutions. RDT&E funds are necessary in the majority of all REF projects. Most importantly, REF requires RDT&E funds to conduct safety certification (testing) for non-standard equipment before it is equipped to the Soldier. This critical requirement exists to ensure that REF-provided equipment is safe for Soldiers to use and that any risks are identified and documented. The REF also requires RDT&E funds to integrate several different COTS/GOTS and NDI technologies into one capability that solves the tougher and more complex problems.

The REF requires RDT&E funds to modify, test, and evaluate existing technologies that were developed for one purpose, however may be suitable to solve another problem. REF will also fund deliberate projects in support of technology-solution-scouting to meet anticipated Army needs and to mitigate operational gaps. These efforts measure and identify current technologies, and provide information to better inform Army Training and Doctrine Command (TRADOC) and other communities of interest, with the intent of enlightening future Army requirements. Example efforts that may require RDTE include the following projects: Tactical Satellite Communications (SATCOM) and communications systems; tactical and small Combat Out Post/Forward Operating Base (COP/FOB) Intelligence, Surveillance, and Reconnaissance (ISR) and Force Protection systems; Counter Unmanned Aerial Systems (CUAS); Electronic Warfare (EW) systems; Non-Tactical Vehicles (NTV); Persistent Duration UAS, and Subterranean (SubT) Operations.

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
<p><b>Title:</b> Rapid Equipping Force</p> <p><b>Description:</b> Funding is provided for the following effort.</p> <p><b>FY 2021 Plans:</b> The REF will focus on discontinuation.</p> <p><b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> The REF has no FY22 RDTE funding request due to closure and discontinuation at the end of FY21, dated 30 Sep 2020, subject: HQDA EXORD 233-20 Discontinuation of the Rapid Equipping Force.</p>	5.678	2.684	-
<b>Accomplishments/Planned Programs Subtotals</b>	5.678	2.684	-

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603747A / <i>Soldier Support and Survivability</i>	<b>Project (Number/Name)</b> C08 / <i>Rapid Equipping Force</i>

**C. Other Program Funding Summary (\$ in Millions)**

<u>Line Item</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2022</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>FY 2026</u>	<u>Cost To</u>	
			<u>Base</u>	<u>OCO</u>	<u>Total</u>					<u>Complete</u>	<u>Total Cost</u>
• M80101: <i>Rapid Equipping Soldier Support Equipment</i>	27.877	17.129	-	-	-	-	-	-	-	-	-

**Remarks**

The REF has no FY22 OPA funding request due to closure and discontinuation at the end of FY21, dated 30 Sep 2020, subject: HQDA EXORD 233-20 Discontinuation of the Rapid Equipping Force.

**D. Acquisition Strategy**

The Rapid Equipping Force (REF) harnesses current and emerging technologies to provide rapid solutions to the urgently required capabilities of U.S. Army Forces employed globally. The REF focus is on rapidly placing capabilities into Soldiers' hands. This mission is accomplished in one of two ways: 1) rapidly adapting COTS/ GOTS/NDI equipment to meet operational needs, and 2) utilizing emerging deployable capabilities via interaction with research and development organizations and academia. All capabilities are safety tested prior to insertion into operational environments. Training and sustainment are provided for every capability until it is transitioned to an approved acquisition program or terminated through an approved Army process. Operational assessments are conducted to provide feedback in support of Army requirements generation and future capability development. REF capabilities routinely serve as a bridge to specific Operational Needs Statement, Joint Urgent Operational Need Statement and Joint Emergent Operational Needs Statement (ONS, JUONS, and JEONS) gaps to meet urgent operational requirements.

The REF has no FY22 RDTE funding request due to closure and discontinuation at the end of FY21, dated 30 Sep 2020, subject: HQDA EXORD 233-20 Discontinuation of the Rapid Equipping Force.



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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army** **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603747A / <i>Soldier Support and Survivability</i>	<b>Project (Number/Name)</b> C08 / <i>Rapid Equipping Force</i>
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<b>Management Services (\$ in Millions)</b>				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
FY 2020 SBIR/STTR Transfer	TBD	Various : Various	-	0.126		-		-		-		-	0.000	0.126	-
<b>Subtotal</b>			-	0.126		-		-		-		-	0.000	0.126	N/A

<b>Product Development (\$ in Millions)</b>				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Mission Command	C/FFP	Various : Various	0.207	0.019		0.010		-		-		-	0.000	0.236	-
Movement and Maneuver	C/FFP	Various : Various	0.387	0.081		0.030		-		-		-	0.000	0.498	-
Intelligence	C/FFP	Various : Various	0.358	0.139		0.050		-		-		-	0.000	0.547	-
Fires	C/FFP	Various : Various	0.014	0.004		0.005		-		-		-	0.000	0.023	-
Sustainment	C/FFP	Various : Various	0.254	0.050		0.011		-		-		-	0.000	0.315	-
Protection	C/FFP	Various : Various	0.582	0.181		0.071		-		-		-	0.000	0.834	-
Dismounted Improvised Explosive Device (IED) Defeat	C/FFP	Various : Various	2.889	-		-		-		-		-	Continuing	Continuing	Continuing
Dismounted Operations Support	C/FFP	Various : Various	4.796	-		-		-		-		-	Continuing	Continuing	Continuing
Intelligence, Surveillance, and Reconnaissance (ISR) Shortfalls in Environmentally Inhospitable OEs	C/FFP	Various : Various	5.951	-		-		-		-		-	Continuing	Continuing	Continuing
Small Combat Outpost (COP) / Patrol Base (PB) Force Protection and Sustainment	C/FFP	Various : Various	3.738	-		-		-		-		-	Continuing	Continuing	Continuing
Other-REF RIPL Priorities (5-10)	C/FFP	Various : Various	8.778	-		-		-		-		-	Continuing	Continuing	-
Other	C/FFP	Various : Various	2.208	-		-		-		-		-	0.000	2.208	-

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army** **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603747A / <i>Soldier Support and Survivability</i>	<b>Project (Number/Name)</b> C08 / <i>Rapid Equipping Force</i>
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<b>Product Development (\$ in Millions)</b>				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Base: Various Projects-Protect the Force in Counter Insurgency	C/FFP	Various : Various	11.841	-		-		-		-		-	0.000	11.841	-
Small Combat Outpost (COP)/Patrol Base (PB) Sustainment	C/FFP	Various : Various	1.506	-		-		-		-		-	0.000	1.506	-
Base: Various Projects-Enhance Intelligence Surveillance Recon	C/FFP	Various : Various	9.009	-		-		-		-		-	0.000	9.009	-
Small Combat Outpost (COP)/Patrol Base (PB) Force Protection	C/FFP	Various : Various	2.093	-		-		-		-		-	0.000	2.093	-
Dismounted Blue Force Tracking and Mission Command	C/FFP	Various : Various	0.528	-		-		-		-		-	0.000	0.528	-
Base: Various Projects-Logistics/Medical in Counterinsurgency Ops	C/FFP	Various : Various	1.639	-		-		-		-		-	0.000	1.639	-
Base: Various Projects-Timeliness of Analysis and Information Dissemination	C/FFP	Various : Various	6.961	-		-		-		-		-	0.000	6.961	-
Congressional Add-Squad Mission Support System (SMSS)	C/FFP	Various : Various	1.600	-		-		-		-		-	0.000	1.600	-
SSTR/Economic Assumptions/FFRDC and SBIR	C/FFP	Various : Various	1.090	-		-		-		-		-	0.000	1.090	-
OCO: Rapid Equipping Force	C/FFP	Various : Various	19.190	-		-		-		-		-	0.000	19.190	-
<b>Subtotal</b>			85.619	0.474		0.177		-		-		-	Continuing	Continuing	N/A

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**Exhibit R-3, RDT&E Project Cost Analysis:** PB 2022 Army Date: May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603747A / <i>Soldier Support and Survivability</i>	<b>Project (Number/Name)</b> C08 / <i>Rapid Equipping Force</i>
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<b>Test and Evaluation (\$ in Millions)</b>				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total				
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost To Complete	Total Cost	Target Value of Contract
ATEC (REF Integrated Priority List 1-10)	C/FFP	Various : Various	11.344	-		-		-		-		-		Continuing	Continuing	Continuing
ATEC (Warfighter Function Areas)	C/FFP	Various : Various	16.219	5.078		2.507		-		-		-		0.000	23.804	-
ATEC (REF Integrated Priority List 1-7)	C/FFP	Various : Various	2.000	-		-		-		-		-		0.000	2.000	-
<b>Subtotal</b>			29.563	5.078		2.507		-		-		-		Continuing	Continuing	N/A

	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
<b>Project Cost Totals</b>	115.182	5.678	2.684	-	-	-	Continuing	Continuing	N/A

Remarks

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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2022 Army</b>			<b>Date: May 2021</b>
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603747A / <i>Soldier Support and Survivability</i>	<b>Project (Number/Name)</b> C08 / <i>Rapid Equipping Force</i>	

Event Name	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Rapid Equipping Force																												

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603747A / <i>Soldier Support and Survivability</i>	<b>Project (Number/Name)</b> C08 / <i>Rapid Equipping Force</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Rapid Equipping Force	2	2021	4	2024

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2022 Army **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040: Research, Development, Test & Evaluation, Army / BA 4: Advanced Component Development & Prototypes (ACD&P)	<b>R-1 Program Element (Number/Name)</b> PE 0603766A / Tactical Electronic Surveillance System - Adv Dev
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	-	37.490	182.400	113.365	-	113.365	-	-	-	-	-	-
907: Tactical Exploitation Of National Capabilities	-	37.490	182.400	18.264	-	18.264	-	-	-	-	-	-
BX9: Tactical Intel Targeting Access Node Adv Develop	-	-	-	20.003	-	20.003	-	-	-	-	-	-
CC5: Low Earth Orbit (LEO) / Intel Surv Recon (ISR)	-	-	-	75.098	-	75.098	-	-	-	-	-	-

**Note**

Change to TENCAP FY2021 to FY2022 funds reflect successful initiation of 3 major efforts -LEO, TITAN Prototype and MDSS - in FY2021 under Project 907 TENCAP, transition and continue in separate Project BX9 'TITAN Prototype', Project CC5 'LEO', and to PE 0604036A Project BY9 for 'MDSS' Program.

Projects BX9 'TITAN Prototype', and Project CC5 'LEO' are not new starts in FY2022; they continue work funded under Project 907 'TENCAP' in FY2021.

MDSS 0604036A is not a New Start in FY2022. MDSS received an initial \$39.625 million in PE 0603766A in FY 2021 and transitions to 0604036A in FY 2022.

All funding is in support of the ACTIVE COMPONENT.

**A. Mission Description and Budget Item Justification**

Tactical Exploitation of National Capabilities (TENCAP) accomplishes the Army's Tactical Electronic Surveillance System Advance Development by leveraging the National Intelligence cross-agency engineering to evaluate, enhance, prototype, and transition Intelligence, Surveillance and Reconnaissance (ISR) technologies/capabilities from the National Intelligence Community (IC) into Army Systems and Architectures. This effort includes both the TENCAP (907) core mission, as well as two major prototyping, development and experimentation efforts: the Tactical Intelligence Targeting Access Node (TITAN) (BX9) prototype, and the Low Earth Orbit (LEO) (CC5) effort.

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2022 Army	<b>Date:</b> May 2021
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<b>Appropriation/Budget Activity</b> 2040: <i>Research, Development, Test &amp; Evaluation, Army / BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0603766A / <i>Tactical Electronic Surveillance System - Adv Dev</i>
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<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022 Base</b>	<b>FY 2022 OCO</b>	<b>FY 2022 Total</b>
Previous President's Budget	37.490	194.775	105.297	-	105.297
Current President's Budget	37.490	182.400	113.365	-	113.365
Total Adjustments	0.000	-12.375	8.068	-	8.068
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-12.375			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	-	-	8.068	-	8.068

**Change Summary Explanation**

Projects BX9 and CC5 are not new starts in FY2022; they continue work initiated in Project 907 in FY2021.  
 MDSS 0604036A is not a New Start in FY2022. MDSS received an initial \$39.625 million in PE 0603766A in FY2021 and transitions to 0604036A in FY2022.  
 \$-12.375 million reflects Appropriations Committee mark to MDSS portion in Project 907 FY2021.  
 \$8.068 internal Army realignments to priority requirements.

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**Exhibit R-2A, RDT&E Project Justification:** PB 2022 Army **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4					<b>R-1 Program Element (Number/Name)</b> PE 0603766A / <i>Tactical Electronic Surveillance System - Adv Dev</i>				<b>Project (Number/Name)</b> 907 / <i>Tactical Exploitation Of National Capabilities</i>			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022 Base</b>	<b>FY 2022 OCO</b>	<b>FY 2022 Total</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>FY 2026</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
907: <i>Tactical Exploitation Of National Capabilities</i>	-	37.490	182.400	18.264	-	18.264	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**Note**

All funding is in support of the ACTIVE COMPONENT.

**A. Mission Description and Budget Item Justification**

The Tactical Exploitation of National Capabilities (TENCAP) office serves as the Army's centralized lead to perform National Intelligence cross-agency engineering to evaluate, enhance, prototype, and transition Intelligence, Surveillance and Reconnaissance (ISR) technologies/capabilities from the National Intelligence Community (IC) into Army systems and architectures. TENCAP programs perform two vital functions for the Army's Warfighters: (1) ensures assured access to current and future National and Commercial sensors and supporting tactical architectures; and (2) exploits and influences new developments that focus on improving the Analysis and Tasking, Collection, Processing, Exploitation, Dissemination and Feedback (TCPEDF) of intelligence data. These functions support the National Defense Strategy as key enablers of the Joint All Domain Operations and the Army's Multi Domain Operations. TENCAP systems provide deep sensing during the competition phase contributing to enables Joint All-Domain Operations: TENCAP systems and technologies provide deep sensing in competition contributing to situational understanding (patterns of life, threat intentions, etc.) and intelligence support to targeting (order of battle, electronic target folders, etc.). TENCAP systems and technologies also address several Large Scale Combat Operations (LSCO) Gaps, including Deep Multi-Domain Sensing, analysis and Processing, Exploitation, and Dissemination (PED) for Indications and Warning (I&W) and Anti-access area-denial (A2AD) targeting.

FY2022 Base funding in the amount of \$18.264M provides: (1) TENCAP systems engineering and collaborative development on multiple validated National Intelligence Community (IC) advanced software and prototype developments that leverage National IC investments for Army use and ensure continuous Army interoperability with National IC assets and architectures; (2) TENCAP Radio Frequency Exploitation; and (3) advanced development of capabilities for Air Vigilance (AV) Army Program of Record.

\*Note: Project LEO that started under Project 907 in FY2021 realigned/moved to Project CC5 in FY2022. Project TITAN Prototype that started under Project 907 in FY2021 realigned/moved to Project BX9 in FY2022. Program MDSS that started in 0603766A under Project 907 in FY2021 transitioned to PE 0604036A Project BY9 in FY2022.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022 Base</b>	<b>FY 2022 OCO</b>	<b>FY 2022 Total</b>
<b>Title:</b> TENCAP Cross-agency Core Engineering activities	14.605	10.845	14.729	-	14.729



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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603766A / <i>Tactical Electronic Surveillance System - Adv Dev</i>	<b>Project (Number/Name)</b> 907 / <i>Tactical Exploitation Of National Capabilities</i>

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022 Base</b>	<b>FY 2022 OCO</b>	<b>FY 2022 Total</b>
<p><b>Description:</b> By utilizing organic and matrix engineering subject matter experts, TENCAP collaborates, develops and exploits emerging multi-intelligence based technologies to satisfy/accelerate Army Intelligence, Surveillance, Reconnaissance (ISR), Mission Command and Force Protection requirements.</p> <p><b>FY 2021 Plans:</b> Will work to incorporate Army requirements into earliest stages of National developments; Ensure Army access to sensors and multi-intelligence based capabilities; Monitor emerging technologies and systems; Exploit advances in commercial imagery and signal technologies; Develop prototypes that improve Army intelligence products. Approximately 50% of the core TENCAP resources will be in the development and integration of TITAN Space prototype.</p> <p><b>FY 2022 Base Plans:</b> Continues to incorporate Army requirements into earliest stages of National developments; Ensure Army access to sensors and multi-intelligence based capabilities; Monitor emerging technologies and systems; Exploit advances in commercial imagery and signal technologies; Develop prototypes that improve Army intelligence products.</p> <p><b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> Increased engagement with and exploitation of National Intelligence Community capabilities to leverage Intelligence Community (IC) investments to support Army modernization priorities.</p>					
<p><b>Title:</b> Air Vigilance - Advanced Development</p> <p><b>Description:</b> Enhance intelligence, force protection, and indications and warning capabilities under Army TENCAP program to pace the proliferation and rapid advances in threat and technology.</p> <p><b>FY 2021 Plans:</b> Will continue to develop advanced signal and software enhancements for Air Vigilance (AV) Army Program of Record that support the programs Capability Drops.</p> <p><b>FY 2022 Base Plans:</b> Continues development of advanced signal and software enhancements for Air Vigilance (AV) Army Program of Record that support the programs Capability Drops.</p> <p><b>FY 2021 to FY 2022 Increase/Decrease Statement:</b></p>	5.479	4.034	2.500	-	2.500

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army			<b>Date:</b> May 2021		
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603766A / <i>Tactical Electronic Surveillance System - Adv Dev</i>	<b>Project (Number/Name)</b> 907 / <i>Tactical Exploitation Of National Capabilities</i>			
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022 Base</b>	<b>FY 2022 OCO</b>	<b>FY 2022 Total</b>
Decrease in funding represents a shift based on program maturation and preparation for system development/demonstration and integration.					
<p><b>Title:</b> Advanced Miniaturized Data Acquisition System(AMDAS)/ AMDAS Dissemination Vehicle (ADV)</p> <p><b>Description:</b> Continue advanced engineering and development efforts to ensure continued interoperability and effectiveness of Army Corp-level TENCAP subsystems that provide national data to the tactical warfighter via intelligence community partners classified national systems. Will become subsystem to Tactical Intelligence Targeting Access Node (TITAN) prototype.</p> <p><b>FY 2021 Plans:</b> AMDAS Next: Will continue the development of TENCAP new prototype subsystem antenna, which will include modeling and simulation along with early developmental testing. Continued work on advance sensor development, and design ground processor, to ensure alignment with evolving national architectural enhancements as the National Technical Means (NTM) capabilities progress. Will become subsystem to TITAN Space prototype.</p> <p><b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> This effort will be funded from Project BX9 TITAN starting in FY2022.</p>	14.559	9.002	-	-	-
<p><b>Title:</b> TENCAP Radio Frequency Exploitation (TRFE)</p> <p><b>Description:</b> Prototype capability software that informs, influences and enhances Multi-Discipline sensor systems within PEO IEW&amp;S such as Air Vigilance (AV), and Terrestrial Layer System (TLS) by targeting modern digital communications systems employed by near-peer nation state armies. Assists with Joint All-Domain Operations radio Frequency (RF) Characterization for modern communication environments with the intent to synchronize Signal Intelligence (SIGINT), Electronic Warfare, and Cyber operations. Utilizes commercial industry components and architectures to minimize hardware costs, risk and maximizes scalability/modularity.</p> <p><b>FY 2021 Plans:</b> Continue to develop the MULTI-INT TRFE cognitive software based SIGINT-Enabled Electronic Warfare and Cyber Attack prototype capability focused on countering Peer State and modern communication targets and threats.</p> <p><b>FY 2022 Base Plans:</b></p>	2.847	2.178	1.035	-	1.035

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army				<b>Date:</b> May 2021	
<b>Appropriation/Budget Activity</b> 2040 / 4		<b>R-1 Program Element (Number/Name)</b> PE 0603766A / <i>Tactical Electronic Surveillance System - Adv Dev</i>		<b>Project (Number/Name)</b> 907 / <i>Tactical Exploitation Of National Capabilities</i>	
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>					
As a follow on to TENCAP Radio Frequency Exploitation (TRFE) prototype, develops the open, government-owned software framework enabling Signal Intelligence (SIGINT), Electronic Warfare and Cyber capabilities.					
<b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> Decrease in funding represents changes from prototype development to software architecture development.					
<b>Title:</b> Tactical Intelligence Targeting Access Node (TITAN) Space Prototype System					
<b>Description:</b> Tactical Intelligence Targeting Access Node (TITAN) prototype system will provide timely assured intelligence for long range precision fires and maneuver in contested and Anti-access area-denial (A2AD) environments; Assured access to Space Intelligence, Surveillance, and Recognizance (ISR): National, Army and Commercial; Software Analytics capability to enable the intelligence cycle with increased speed, precision and accuracy Automated/Assisted Sensor-to-Shooter workflows: speed, scalability, accuracy to support Long Range Precision Fires (LRPF) in an A2AD environment; Modern and consolidated ground station for space and select national commercial theater sensors.					
TITAN is aligned with its own project BX9 effective FY2022.					
<b>FY 2021 Plans:</b> Continue the development and integration of the TITAN space prototype system that will provide rapid availability of National Overhead Systems (NOS) GEOINT and SIGINT capability. Continue to develop and integrate with the Remote Ground Terminal (RGT) and LEO constellation, the downlink, ingest and processing of commercial imagery. Continue the development and integration of automated target recognition along with integrating the fires architecture to support Army's #1 priority, Long Range Precision Fires (LRPF).					
<b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> TITAN Prototype is transitioned to Project BX9 effective FY2022.					
<b>Title:</b> Multi-Domain Sensing System (MDSS)					
<b>Description:</b> The Multi Domain Sensor System (MDSS) will provide multiple sensing capabilities by developing and prototyping survivable sensor capabilities on higher altitude platforms that can perform effective stand-off operations. They include Electronic Intelligence (ELINT), Communications Intelligence (COMINT), Synthetic Aperture Radar (SAR), Moving Target Indicator (MTI), Cyber/EW, Air-Launched Effects (ALE) and Aircraft Survivability sensors.					
	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022 Base</b>	<b>FY 2022 OCO</b>	<b>FY 2022 Total</b>
	-	30.000	-	-	-
	-	39.625	-	-	-

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603766A / <i>Tactical Electronic Surveillance System - Adv Dev</i>	<b>Project (Number/Name)</b> 907 / <i>Tactical Exploitation Of National Capabilities</i>

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022 Base</b>	<b>FY 2022 OCO</b>	<b>FY 2022 Total</b>
MDSS is aligned with its own PE 060403 Project BY9 effective FY2022.					
<b>FY 2021 Plans:</b> Funding supports MDSS prototype efforts					
<b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> MDSS is aligned with its own PE 0604036A Project BY9 effective FY2022.					
<b>Title:</b> Low Earth Orbit Satellite Capability	-	86.716	-	-	-
<b>Description:</b> The Low Earth Orbit (LEO) effort will provide prototyping, development and experimentation of the Tactical Space Layer (TSL) sensors (electro optical, synthetic aperture radar, and radio frequency) which are designed to provide wide-area, responsive deep area sensing required for beyond line of sight (BLOS) targeting and force maneuver, significantly reducing Sensor to Shooter (S2S) timelines. Follow-on persistent prototype tactical sensor capabilities will be integrated with the Army Tactical Intelligence Targeting Access Node (TITAN) ground station which will provide direct tasking and assured access directly supporting live-fire Sensor-to-Shooter (S2S) demonstrations and assessments.					
<b>FY 2021 Plans:</b> Provides for follow-on persistent prototype, development, and experimentation of tactical sensor capabilities which will be integrated with the Army Tactical Intelligence Targeting Access Node (TITAN) ground station which will provide direct tasking and assured access directly supporting live-fire S2S demonstrations and assessments.					
<b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> LEO is transitioned to Project CC5 effective FY2022.					
<b>Accomplishments/Planned Programs Subtotals</b>	37.490	182.400	18.264	-	18.264

<b>C. Other Program Funding Summary (\$ in Millions)</b>											
<b>Line Item</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022 Base</b>	<b>FY 2022 OCO</b>	<b>FY 2022 Total</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>FY 2026</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
• 0605766A: <i>National Capabilities Integration (MIP)</i>	7.835	7.670	14.454	-	14.454	-	-	-	-	-	-
• OMA - 122021: <i>Contractor Logistics Support and Other Weapon Support</i>	-	-	0.000	11.360	11.360	-	-	-	-	-	-

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603766A / <i>Tactical Electronic Surveillance System - Adv Dev</i>	<b>Project (Number/Name)</b> 907 / <i>Tactical Exploitation Of National Capabilities</i>

**C. Other Program Funding Summary (\$ in Millions)**

<u>Line Item</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022</u> <u>Base</u>	<u>FY 2022</u> <u>OCO</u>	<u>FY 2022</u> <u>Total</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>FY 2026</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
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**Remarks**

**D. Acquisition Strategy**

The Army Tactical Exploitation of National Capabilities (TENCAP) mission is a Congressionally-mandated and chartered enduring requirement to leverage National Intelligence capabilities useful to the tactical Army. The Army TENCAP acquisition strategy is driven by an annual TENCAP General Officer Steering Group (TGOSG), co-chaired by the Army G-2, Army G-8, Military Deputy to the Assistant Secretary of the Army for Acquisition, Logistics, and Technology [ASA (ALT)], and includes representatives from the Army G-3, Army G-6, Army Futures Command Intelligence-Capability Development and Integration Directorate, Army Training and Doctrine Command (TRADOC), and the Program Executive Office for Intelligence, Electronic Warfare and Sensors (PEO IEW&S). The TENCAP General Officers Steering Group (GOSG) reviews, validates, prioritizes, and guides Army TENCAP efforts, according to Army and Defense strategy. Based on the TGOSG guidance, Army TENCAP invests BA 6.4 RDTE in Intelligence Community (IC) developments during the more cost-effective advanced development phase to ensure Army requirements are met with minimal redundancy to Army investments. Army TENCAP then uses BA 6.5 RDTE to manage the transition of these advanced development efforts through system development and integration into Army Programs of Record (POR). This strategy ensures these leveraged investments remain viable through multiple budget cycles, significantly increasing successful transition to recipient Army PORs. With acquisition discipline and oversight provided by PEO IEW&S, Army TENCAP executes the TGOSG approved efforts through use of multiple contracts and agreements with the military, National Intelligence agencies, labs, industry partners and academia for the full duration required to complete development and transition these national capabilities into enduring Army programs.

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army** **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603766A / <i>Tactical Electronic Surveillance System - Adv Dev</i>	<b>Project (Number/Name)</b> 907 / <i>Tactical Exploitation Of National Capabilities</i>
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<b>Management Services (\$ in Millions)</b>				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
TENCAP Intelligence Engineers (SETA)	Option/CPFF	Perspecta : Alexandria, VA	25.746	3.100	Jan 2020	1.500	Jan 2021	1.500	Jan 2022	-		1.500	0.000	31.846	Continuing
TENCAP Intelligence Engineers(Matrix Gov)	MIPR	Army Geospatial Cener (AGC) : Alexandria, VA	8.557	2.300	Jan 2020	1.200	Jan 2021	1.500	Oct 2022	-		1.500	0.000	13.557	Continuing
TENCAP Intelligence Engineers (SETA) for TITAN Space prototype development (in Proj BX9 in FY22)	Option/CPFF	Perspecta : Alexandria, VA	-	-		1.307	Jan 2021	-		-		-	0.000	1.307	Continuing
TENCAP Intelligence Engineers (Matrix Gov) for TITAN Space prototype dev (in Proj BX9 in FY22)	MIPR	Army Geospatial Center (AGC) : Alexandria, VA	-	-		0.900	Mar 2021	-		-		-	0.000	0.900	-
SETA Support MDSS (realigns to PE 0604036A, Proj BY9 in FY22)	C/CPFF	DHPC : Woodbridge, NJ	-	-		1.500	Mar 2021	-		-		-	0.000	1.500	-
SETA Support LEO (realigns to Proj CC5 in FY22)	C/FFP	A-PNT / TENCAP : Multiple locations	-	-		5.000	Jan 2021	-		-		-	0.000	5.000	-
<b>Subtotal</b>			34.303	5.400		11.407		3.000		-		3.000	0.000	54.110	N/A

<b>Product Development (\$ in Millions)</b>				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
TENCAP Core (Focus) Areas	Various	Multiple : Multiple	21.652	5.980	Feb 2020	5.920	Feb 2021	8.129	Feb 2022	-		8.129	0.000	41.681	Continuing
Air Vigilance	MIPR	Classified : MIPR	14.738	5.479	Jan 2020	4.034	Jan 2021	2.500	Jan 2021	-		2.500	0.000	26.751	Continuing
AMDAS/ADV (capability transitions to TITAN Prototype)	MIPR	Classified : MIPR	32.450	12.959	Jan 2020	8.918	Jan 2021	-		-		-	0.000	54.327	Continuing
TRFE	MIPR	Classified : MIPR	5.121	2.847	Jan 2020	2.178	Jan 2021	1.035	Jan 2022	-		1.035	0.000	11.181	Continuing

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army** **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603766A / <i>Tactical Electronic Surveillance System - Adv Dev</i>	<b>Project (Number/Name)</b> 907 / <i>Tactical Exploitation Of National Capabilities</i>
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<b>Product Development (\$ in Millions)</b>				<b>FY 2020</b>		<b>FY 2021</b>		<b>FY 2022 Base</b>		<b>FY 2022 OCO</b>		<b>FY 2022 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>			
TITAN Prototype Development	C/FFP	Northrup Grumman : Aurora, CO	-	-		24.102	Jan 2021	-		-		-	0.000	24.102	Continuing
MDSS (legacy) Sensor Improvements (LRR) (realigns to PE 0604036A, Proj BY9 in FY22)	SS/FFP	Northrup Grumman : Baltimore, MD	-	-		12.125	Feb 2021	-		-		-	0.000	12.125	-
MDSS Flyoff Contracts (realigns to PE 0604036A, Proj BY9 in FY22)	TBD	TBD : TBD	-	-		9.000	Jun 2021	-		-		-	0.000	9.000	-
MDSS Sensor Development Contract (realigns to PE 0604036A, Proj BY9 in FY22)	SS/FFP	Northrup Grumman : Baltimore, MD	-	-		15.000	Apr 2021	-		-		-	0.000	15.000	-
LEO Contracts (realigns to Proj CC5 in FY22)	MIPR	Various OTAs and CCDC Organizations : Multiple Locations	-	-		70.400	Jan 2021	-		-		-	0.000	70.400	-
<b>Subtotal</b>			73.961	27.265		151.677		11.664		-		11.664	0.000	264.567	N/A

<b>Support (\$ in Millions)</b>				<b>FY 2020</b>		<b>FY 2021</b>		<b>FY 2022 Base</b>		<b>FY 2022 OCO</b>		<b>FY 2022 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>			
TENCAP Prgm Mgmt-Dir Gov,travel,etc.	Allot	Army TENCAP : Alexandria, VA	15.989	3.900	Jan 2020	2.311	Jan 2021	2.500	Jan 2022	-		2.500	0.000	24.700	Continuing
TENCAP Secured Facilities	MIPR	Army Geospatial Center (AGC) : Alexandria, VA	3.577	0.500	Jan 2020	0.525	Jan 2021	0.700	Jan 2022	-		0.700	0.000	5.302	Continuing
TENCAP Prgm Mgmt - TITAN Space prototype development (realigns to Proj BX9 in FY22)	Allot	Army TENCAP : Alexandria, VA	-	-		1.800	Jan 2021	-		-		-	0.000	1.800	Continuing

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army** **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603766A / <i>Tactical Electronic Surveillance System - Adv Dev</i>	<b>Project (Number/Name)</b> 907 / <i>Tactical Exploitation Of National Capabilities</i>
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<b>Support (\$ in Millions)</b>				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Prog Mgmt- MDSS (realigns to PE 0604036A, Proj BY9 in FY22)	MIPR	PM SAI : Aberdeen, MD	-	-		2.000	Mar 2021	-		-		-	0.000	2.000	-
LEO Prog Mgmt (realigns to Proj CC5 in FY22)	C/CPFF	T2S, Inc. : Huntsville, AL	-	-		3.400	Oct 2020	-		-		-	0.000	3.400	-
<b>Subtotal</b>			19.566	4.400		10.036		3.200		-		3.200	0.000	37.202	N/A

<b>Test and Evaluation (\$ in Millions)</b>				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
TENCAP Lab Tests, Exercises, Simulations	MIPR	Multiple : Multiple	2.206	0.425	Jan 2020	0.400	Jan 2021	0.400	Jan 2022	-		0.400	0.000	3.431	Continuing
Test and Exercises - TITAN Space prototype development (realigns to Proj BX9 in FY22)	MIPR	Multiple : Multiple	-	-		0.880	Jan 2021	-		-		-	0.000	0.880	-
LEO Tests (realigns to Proj CC5 in FY22)	MIPR	A-PNT / TENCAP : Multiple Locations	-	-		8.000	Mar 2021	-		-		-	0.000	8.000	-
<b>Subtotal</b>			2.206	0.425		9.280		0.400		-		0.400	0.000	12.311	N/A

	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
<b>Project Cost Totals</b>		130.036	37.490	182.400	18.264	18.264	0.000	368.190	N/A

**Remarks**



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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2022 Army</b>			<b>Date: May 2021</b>		
<b>Appropriation/Budget Activity</b> 2040 / 4		<b>R-1 Program Element (Number/Name)</b> PE 0603766A / <i>Tactical Electronic Surveillance System - Adv Dev</i>		<b>Project (Number/Name)</b> 907 / <i>Tactical Exploitation Of National Capabilities</i>	

Event Name	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
CORE Cross-Agency Advanced Development and Engineering	Development with Nat Intel Community																											
TENCAP General Officer Steering Group (TGOSG) - annual - guides FY22-26 POM					▲ 1																							
TENCAP General Officer Steering Group (TGOSG) - annual - guides FY23-27 POM					▲ 2																							
TENCAP General Officer Steering Group (TGOSG) - annual - guides FY24-28 POM									▲ 3																			
TENCAP General Officer Steering Group (TGOSG) - annual - guides FY25-29 POM													▲ 4															
TENCAP General Officer Steering Group (TGOSG) - annual - guides FY26-30 POM																	▲ 5											
Air Vigilance Advanced Development and System prototype eff	Development with Nat Intel Community																											
TRFE Prototype Development and System Integration Efforts	Development with Nat Intel Community																											
MDSS (ADV Payload DEV & Support) (realigns to PE 0604036A, Proj BY9 in FY22)																												
LEO Development and Program Support (realigns to Proj CC5 in FY22)																												

**Note**  
MDSS is aligned with its own PE 0604036A Project BY9 effective FY2022.

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603766A / <i>Tactical Electronic Surveillance System - Adv Dev</i>	<b>Project (Number/Name)</b> 907 / <i>Tactical Exploitation Of National Capabilities</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
CORE Cross-Agency Advanced Development and Engineering	1	2018	4	2026
TENCAP General Officer Steering Group (TGOSG) - annual - guides FY20-24 POM	2	2018	2	2018
TENCAP General Officer Steering Group (TGOSG) - annual - guides FY21-25 POM	2	2019	2	2019
TENCAP General Officer Steering Group (TGOSG) - annual - guides FY22-26 POM	4	2020	4	2020
TENCAP General Officer Steering Group (TGOSG) - annual - guides FY23-27 POM	2	2021	2	2021
TENCAP General Officer Steering Group (TGOSG) - annual - guides FY24-28 POM	2	2022	2	2022
TENCAP General Officer Steering Group (TGOSG) - annual - guides FY25-29 POM	2	2023	2	2023
TENCAP General Officer Steering Group (TGOSG) - annual - guides FY26-30 POM	2	2024	2	2024
Air Vigilance Advanced Development and System prototype efforts	3	2013	4	2026
TRFE Prototype Development and System Integration Efforts	1	2018	4	2026
MDSS (ADV Payload DEV & Support) (realigns to PE 0604036A, Proj BY9 in FY22)	1	2021	4	2021
LEO Development and Program Support (realigns to Proj CC5 in FY22)	1	2021	4	2021

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army										<b>Date:</b> May 2021		
<b>Appropriation/Budget Activity</b> 2040 / 4					<b>R-1 Program Element (Number/Name)</b> PE 0603766A / <i>Tactical Electronic Surveillance System - Adv Dev</i>				<b>Project (Number/Name)</b> BX9 / <i>Tactical Intel Targeting Access Node Adv Develop</i>			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022 Base</b>	<b>FY 2022 OCO</b>	<b>FY 2022 Total</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>FY 2026</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
BX9: <i>Tactical Intel Targeting Access Node Adv Develop</i>	-	-	-	20.003	-	20.003	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**Note**

Project BX9 is not a new start in FY2022; BX9 continues work funded by Project 907 in FY2021, and realigns into Project BX9 in FY2022.

All funding is in support of the ACTIVE COMPONENT.

**A. Mission Description and Budget Item Justification**

Tactical Intelligence Targeting Access Node (TITAN) Advanced Development will develop and prototype ground station capabilities that will provide timely assured intelligence for long range precision fires, maneuver and improved situational awareness in contested and Anti-access area-denial (A2AD) environments through assured access to Space Intelligence, Surveillance, and Recognizance (ISR): National and Commercial. TITAN Advanced Development will also develop and prototype Software Analytics capabilities to enable the intelligence cycle with increased speed, precision and accuracy through Automated/Assisted Sensor-to-Shooter workflows. These developments will improve speed, scalability, and accuracy to support Long Range Precision Fires (LRPF) in an A2AD environment. TITAN is a modern and consolidated ground station for space and select aerial sensors.

FY2022 base funding in the amount of \$20.003 million provides for the continued development of the TITAN prototype system that will provide rapid availability of National Overhead Systems (NOS) Geospatial Intelligence (GEOINT) and signal intelligence (SIGINT) capabilities; continued development of the Remote Ground Terminal (RGT); and continued development and refinement of automated/assisted target recognition along with enhanced interoperability into the fires architecture.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022 Base</b>	<b>FY 2022 OCO</b>	<b>FY 2022 Total</b>
<b>Title:</b> Tactical Intelligence Targeting Access Node (TITAN) Adv Development Prototype System	-	-	20.003	-	20.003
<b>Description:</b> Tactical Intelligence Targeting Access Node (TITAN) prototype system will provide timely assured intelligence for long range precision fires and maneuver in contested and Anti-access area-denial (A2AD) environments; Assured access to Space Intelligence, Surveillance, and Recognizance (ISR): National, Army and Commercial; Software Analytics capability to enable the intelligence cycle with increased speed, precision and accuracy Automated/Assisted Sensor-to-Shooter workflows: speed, scalability, accuracy to support Long Rang Precision Fires (LRPF) in an A2AD environment; Modern and consolidated ground station for space and select national commercial theater sensors.					

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603766A / <i>Tactical Electronic Surveillance System - Adv Dev</i>	<b>Project (Number/Name)</b> BX9 / <i>Tactical Intel Targeting Access Node Adv Develop</i>

**B. Accomplishments/Planned Programs (\$ in Millions)**

	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
TITAN is aligned with its own project BX9 effective FY2022.					
<b><i>FY 2022 Base Plans:</i></b> Continue the development of the Tactical Intelligence Targeting Access Node (TITAN) prototype system that will provide rapid availability of National Reconnaissance Office (NRO) Overhead Systems (NOS) Geospatial Intelligence (GEOINT) and Signal Intelligence (SIGINT) capabilities. Continue to develop the Remote Ground Terminal (RGT) to include emerging Low Earth Orbit (LEO) constellations, improved downlink, ingest and processing of commercial and government remote sensing data. Continue the development and refinement of automated/assisted target recognition along with enhanced interoperability into the fires architecture to support Army's #1 priority, Long Range Precision Fires (LRPF).					
<b><i>FY 2021 to FY 2022 Increase/Decrease Statement:</i></b> Funding realigns from Project 907 to BX9 in FY2022					
<b>Accomplishments/Planned Programs Subtotals</b>	-	-	20.003	-	20.003

**C. Other Program Funding Summary (\$ in Millions)**

<u>Line Item</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022 Base</u>	<u>FY 2022 OCO</u>	<u>FY 2022 Total</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>FY 2026</u>	<u>Cost To Complete</u>	<u>Total Cost</u>
• 0605766A: <i>National Capabilities Integration (MIP)</i>	7.835	7.670	14.454	-	14.454	-	-	-	-	-	-

**Remarks**

**D. Acquisition Strategy**

The TITAN prototype requirement was validated by the TENCAP General Officer Steering Group in April 2019. In order to maximize agility and innovation in acquisition, TENCAP is working with the Defense Innovation Unit to establish an Other Transaction Authority (OTA) agreement to develop the TITAN prototype. The TITAN prototype will provide a modernized, deployable ground station capable of rapidly and semi-autonomously tasking, receiving, processing, exploiting, fusing, and disseminating space-based sensor data to provide networked situational awareness and direct tactical support to Army commanders at echelon. The TITAN Prototype will reduce sensor to shooter latency to provide timely intelligence support to the commander. The TITAN prototype will use an agile acquisition strategy, and will maximize non-proprietary / open system architectures to enable easy upgrade of software/firmware, analytics/algorithms, and ingest additional data streams as commercial vendors and national data become available. This OTA has been preceded by Soldier touchpoints to inform this acquisition, and Soldier engagement is planned throughout the development and demonstration of the prototype.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army												Date: May 2021			
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)							
2040 / 4				PE 0603766A / Tactical Electronic Surveillance System - Adv Dev				BX9 / Tactical Intel Targeting Access Node Adv Develop							
Management Services (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
TITAN Engineering Services	MIPR	Perspecta : Alexandria, VA	0.001	-		-		1.500	Jan 2022	-		1.500	0.000	1.501	-
<b>Subtotal</b>			0.001	-		-		1.500		-		1.500	0.000	1.501	N/A
Product Development (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
TITAN Prototype Development	C/FFP	Northrup Grumman : Aurora, CA	0.001	-		-		15.503	Jul 2020	-		15.503	0.000	15.504	-
<b>Subtotal</b>			0.001	-		-		15.503		-		15.503	0.000	15.504	N/A
Support (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
TITAN Prototype Program Management	MIPR	Army TENCAP : Alexandria, VA	0.001	-		-		2.000	Jan 2022	-		2.000	0.000	2.001	-
<b>Subtotal</b>			0.001	-		-		2.000		-		2.000	0.000	2.001	N/A
Test and Evaluation (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
TITAN Test and Exercises	TBD	Multiple : Miltiple	0.001	-		-		1.000	Jan 2022	-		1.000	0.000	1.001	-
<b>Subtotal</b>			0.001	-		-		1.000		-		1.000	0.000	1.001	N/A
<b>Project Cost Totals</b>			0.004	-		0.000		20.003		-		20.003	0.000	20.007	N/A

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<b>Exhibit R-3, RDT&amp;E Project Cost Analysis:</b> PB 2022 Army							<b>Date:</b> May 2021			
<b>Appropriation/Budget Activity</b> 2040 / 4			<b>R-1 Program Element (Number/Name)</b> PE 0603766A / <i>Tactical Electronic Surveillance System - Adv Dev</i>			<b>Project (Number/Name)</b> BX9 / <i>Tactical Intel Targeting Access Node Adv Develop</i>				
	<b>Prior Years</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022 Base</b>	<b>FY 2022 OCO</b>	<b>FY 2022 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>	

**Remarks**

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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2022 Army</b>			<b>Date: May 2021</b>
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603766A / <i>Tactical Electronic Surveillance System - Adv Dev</i>	<b>Project (Number/Name)</b> BX9 / <i>Tactical Intel Targeting Access Node Adv Develop</i>	

Event Name	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Tactical Intelligence Targeting Access Node																												
TITAN Pre-Production Development																												
Risk Reduction w/Legacy Ground Systems																												
TITAN Prototype																												
TITAN Prototype Assessment																												
TITAN P3I Efforts																												
TITAN Prototype Delivery									▲ 1																			
Operational Leave Behind													▲ 2															

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603766A / <i>Tactical Electronic Surveillance System - Adv Dev</i>	<b>Project (Number/Name)</b> BX9 / <i>Tactical Intel Targeting Access Node Adv Develop</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Tactical Intelligence Targeting Access Node	1	2021	4	2026
TITAN Pre-Production Development	1	2021	2	2023
Risk Reduction w/Legacy Ground Systems	1	2020	2	2022
TITAN Prototype	1	2021	2	2022
TITAN Prototype Assessment	3	2022	2	2023
TITAN P3I Efforts	3	2023	4	2026
TITAN Prototype Delivery	3	2022	3	2022
Operational Leave Behind	2	2023	2	2023



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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army										<b>Date:</b> May 2021		
<b>Appropriation/Budget Activity</b> 2040 / 4					<b>R-1 Program Element (Number/Name)</b> PE 0603766A / <i>Tactical Electronic Surveillance System - Adv Dev</i>				<b>Project (Number/Name)</b> CC5 / <i>Low Earth Orbit (LEO) / Intel Surv Recon (ISR)</i>			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022 Base</b>	<b>FY 2022 OCO</b>	<b>FY 2022 Total</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>FY 2026</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
CC5: <i>Low Earth Orbit (LEO) / Intel Surv Recon (ISR)</i>	-	-	-	75.098	-	75.098	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**Note**

Project CC5 is not a new start in FY2022; CC5 continues work funded by Project 907 in FY2021 which is restructured into Project CC5 in FY2022.

All funding is in support of the ACTIVE COMPONENT.

**A. Mission Description and Budget Item Justification**

The Low Earth Orbit (LEO) effort will provide prototyping, development and experimentation of High Altitude sensors and Tactical Space Layer (TSL) sensors (electro optical, synthetic aperture radar, and radio frequency) which are designed to provide wide-area, responsive deep area sensing required for beyond line of sight (BLOS) targeting and force maneuver, significantly reducing Sensor to Shooter (S2S) timelines. Follow-on persistent prototype tactical sensor capabilities will be integrated with the Army Tactical Intelligence Targeting Access Node (TITAN) ground station and theater gateways which will provide direct tasking and assured access directly supporting live-fire Sensor-to-Shooter (S2S) demonstrations and assessments.

FY2022 Base funding in the amount of \$75.098 million provides prototyping, experimentation, and risk reduction activities to satellite prototypes, supporting wide area, responsive, and deep area sensing and force maneuver. It will enable ground stations to dynamically task, receive and disseminate data to directly support live-fire S2S demonstrations and assessments.

All funding is in support of the Active Component.

Note: LEO funding transitions from Project 907 to Project CC5 in FY2022.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022 Base</b>	<b>FY 2022 OCO</b>	<b>FY 2022 Total</b>
<b>Title:</b> CC5 / Low Earth Orbit (LEO) Intel Surv Recon (ISR)	-	-	75.098	-	75.098
<b>Description:</b> The Low Earth Orbit (LEO) effort will provide prototyping, development and experimentation of High Altitude sensors and Tactical Space Layer (TSL) sensors (electro optical, synthetic aperture radar, and radio frequency) which are designed to provide wide-area, responsive deep area sensing required for beyond line of sight (BLOS) targeting and force maneuver, significantly reducing Sensor to Shooter (S2S) timelines. Follow-on persistent prototype tactical sensor capabilities will be integrated with the Army Tactical Intelligence					

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603766A / <i>Tactical Electronic Surveillance System - Adv Dev</i>	<b>Project (Number/Name)</b> CC5 / <i>Low Earth Orbit (LEO) / Intel Surveillance Recon (ISR)</i>

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022 Base</b>	<b>FY 2022 OCO</b>	<b>FY 2022 Total</b>
Targeting Access Node (TITAN) ground station and theater gateways which will provide direct tasking and assured access directly supporting live-fire Sensor-to-Shooter (S2S) demonstrations and assessments.					
<b><i>FY 2022 Base Plans:</i></b> Provides for follow-on prototype, development, and experimentation of High Altitude and tactical space layer which will be integrated with the Army Tactical Intelligence Targeting Access Node (TITAN) ground station and theater gateways to provide direct tasking and assured access directly supporting live-fire Sensor to Shooter (S2S) demonstrations and assessments.					
<b><i>FY 2021 to FY 2022 Increase/Decrease Statement:</i></b> Project transitions from PE 0603766A Project 907 to Project CC5 in FY2022.					
<b>Accomplishments/Planned Programs Subtotals</b>	-	-	75.098	-	75.098

**C. Other Program Funding Summary (\$ in Millions)**

N/A

**Remarks**

**D. Acquisition Strategy**

The Low Earth Orbit (LEO) effort supports work with the Intelligence Community (IC) and our Mission Partner on the prototyping, development, and experimentation of High Altitude and Tactical Space Layer (TSL) sensors (electro optical, synthetic aperture radar, and radio frequency) designed to provide wide-area, responsive deep area sensing required for beyond line of sight (BLOS) targeting and force maneuver, significantly reducing Sensor to Shooter (S2S) timelines. Follow-on persistent prototype tactical sensor capabilities will be integrated with the Army Tactical Intelligence Targeting Access Node (TITAN) ground station and theater gateways which will provide direct tasking and assured access directly supporting live-fire S2S demonstrations and assessments. Existing Mission Partner contracts and Aviation & Missile Technology Consortium (AMTC) Other Transaction Authority (OTAs) will be used for Prototype Development, Engineering Services and Test and Evaluation Support.

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army** **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603766A / <i>Tactical Electronic Surveillance System - Adv Dev</i>	<b>Project (Number/Name)</b> CC5 / <i>Low Earth Orbit (LEO) / Intel Surveillance Recon (ISR)</i>
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<b>Management Services (\$ in Millions)</b>				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
LEO Prototype Development and Engineering Services Support	C/FFP	A-PNT / TENCAP : Multiple Locations	-	-		-		5.000	Oct 2021	-		5.000	0.000	5.000	-
<b>Subtotal</b>			-	-		-		5.000		-		5.000	0.000	5.000	N/A

<b>Product Development (\$ in Millions)</b>				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
LEO Development (Classified)	MIPR	TBD : TBD	-	-		-		58.598	Jan 2022	-		58.598	0.000	58.598	-
<b>Subtotal</b>			-	-		-		58.598		-		58.598	0.000	58.598	N/A

<b>Support (\$ in Millions)</b>				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
LEO Program MGMT	TBD	APNT CFT : Huntsville, AL	-	-		-		3.500	Oct 2021	-		3.500	0.000	3.500	-
<b>Subtotal</b>			-	-		-		3.500		-		3.500	0.000	3.500	N/A

<b>Test and Evaluation (\$ in Millions)</b>				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
LEO Prototype Tests and Evaluations	TBD	Multiple : Multiple	-	-		-		8.000	Jan 2022	-		8.000	0.000	8.000	-
<b>Subtotal</b>			-	-		-		8.000		-		8.000	0.000	8.000	N/A

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<b>Exhibit R-3, RDT&amp;E Project Cost Analysis:</b> PB 2022 Army							<b>Date:</b> May 2021				
<b>Appropriation/Budget Activity</b> 2040 / 4			<b>R-1 Program Element (Number/Name)</b> PE 0603766A / <i>Tactical Electronic Surveillance System - Adv Dev</i>				<b>Project (Number/Name)</b> CC5 / <i>Low Earth Orbit (LEO) / Intel Surveillance Recon (ISR)</i>				
	<b>Prior Years</b>	<b>FY 2020</b>	<b>FY 2021</b>		<b>FY 2022 Base</b>	<b>FY 2022 OCO</b>	<b>FY 2022 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>	
<b>Project Cost Totals</b>	-	-	0.000		75.098	-	75.098	0.000	75.098	N/A	

**Remarks**

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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2022 Army</b>			<b>Date: May 2021</b>		
<b>Appropriation/Budget Activity</b> 2040 / 4		<b>R-1 Program Element (Number/Name)</b> PE 0603766A / <i>Tactical Electronic Surveillance System - Adv Dev</i>		<b>Project (Number/Name)</b> CC5 / <i>Low Earth Orbit (LEO) / Intel Sur Recon (ISR)</i>	

Event Name	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
LEO Prototyping, Development, and Experimentation																												
CC5 / Low Earth Orbit (LEO) / Intel Sur Recon (ISR)																												

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603766A / <i>Tactical Electronic Surveillance System - Adv Dev</i>	<b>Project (Number/Name)</b> CC5 / <i>Low Earth Orbit (LEO) / Intel Sur Recon (ISR)</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
LEO Prototyping, Development, and Experimentation	1	2020	4	2021
CC5 / Low Earth Orbit (LEO) / Intel Sur Recon (ISR)	1	2022	4	2025

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**Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Army** **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040: Research, Development, Test & Evaluation, Army / BA 4: Advanced Component Development & Prototypes (ACD&P)	<b>R-1 Program Element (Number/Name)</b> PE 0603774A / Night Vision Systems Advanced Development
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	-	192.530	15.429	18.000	-	18.000	-	-	-	-	-	-
BQ5: Visual Augmentation System Advanced Development	-	185.328	5.475	11.699	-	11.699	-	-	-	-	-	-
VT7: Soldier Maneuver Sensors - Adv Dev	-	5.780	7.289	3.777	-	3.777	-	-	-	-	-	-
VT8: SOLDIER PRECISION TARGETING DEVICES - ADV DEV	-	1.422	2.665	2.524	-	2.524	-	-	-	-	-	-

**A. Mission Description and Budget Item Justification**

This Program Element focuses on efforts to evaluate and integrate technologies and representative prototype systems that facilitate the development of Soldier-borne sensor devices transitioning from the laboratory to operational use. Efforts focus on proving out commonality across as broad a spectrum of users as possible to provide enhanced Soldier products, giving them superiority on the battlefield.

Project BQ5 (Visual Augmentation System-Advanced Development) This project evaluates and integrates technologies and representative prototype systems transitioning from the Science and Technology (S&T) stage. It focuses on developing the next generation augmented vision and situational awareness system that provides the Soldier with the ability to fight, rehearse, train and win during multi-domain operations. Funded efforts will accelerate the development of components, terrain shared coordinate data and processing, algorithms including machine learning/artificial intelligence and demonstrations in support of the next generation augmented vision and situational awareness system. Efforts will provide rapid decision making and targeting capabilities with the integration of external video and data sources such as weapon sights, unmanned air and ground vehicles and other data sources enabled by tactical cloud package and advanced network services. This project will provide data driven analytics to optimize unit performance and enhance lethality and to enable Synthetic Training Environment (STE) squad capability to perform live mixed reality training and rehearsing. This project includes costs for efforts associated with movement of information and high level processing, integration, and interface of products with the Soldiers' head, body, weapon, and transportation. This is a priority of the Secretary's Close Combat Lethality Task Force. Funding in this project aligns with the Army's priorities in support of the National Defense Strategy. This project supports the Soldier Lethality Cross Functional Team.

Project VT7 (Soldier Maneuver Sensors-Advanced Development) enables development of emerging capabilities for the maneuver force, that are envisioned by the Soldier Lethality Cross Functional Team, the Maneuver Center of Excellence (MCoE), the Maneuver Capabilities Development Integration Directorate (MCDID), the Science and Technology (S&T) community, industry partners or the acquisition workforce that may provide the Soldier or Squad increased capability to "fight, win and survive, day and night, in a multi- domain environment now and tomorrow". This project also allows pursuit of technology breakthroughs that challenge current technical solutions and have the potential for providing increased Soldier performance. This effort focuses on capabilities that enable modernization of Soldier sensor and laser devices, including digital features and enhanced solutions including maneuver capabilities to detect, recognize and identify targets, and to provide target acquisition and handoff capabilities to mitigate threats. The integration of higher performing multi-spectral sensors with smart processing will provide adjusted weapon

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2022 Army	<b>Date:</b> May 2021
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<b>Appropriation/Budget Activity</b> 2040: <i>Research, Development, Test &amp; Evaluation, Army / BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0603774A / <i>Night Vision Systems Advanced Development</i>
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sight reticles and leverage network connectivity for improved situational awareness/understanding. Additional project capabilities include advanced optical components and assemblies and techniques for signature management, resiliency across the electromagnetic spectrum, and integration of a modular design structure for target acquisition applications including support for wireless data transfer, passive range determination, technologies for working in a GPS contested environment, advanced GPS replacement technologies and mitigation of manned and unmanned threat sensor systems. This project supports efforts to evaluate and integrate technologies and representative prototype systems including Micro Electronics Modules (MEMS) technology with improved size, weight and power for development of modernized Soldier sensor capabilities transitioning from the S&T stage to operational use. This project includes costs for efforts associated with development, certification, verification and validation of interface products into the Adaptive Squad Architecture (ASA). This project also includes development of tools and emulators of ASA components. Funding in this project aligns with Army's priorities in support of the National Defense Strategy.

Project VT8 (Soldier Precision Targeting Devices - Advanced Development) enables development of emerging capabilities for the maneuvers and fires community, that are envisioned by the Soldier Lethality Cross Functional Team, the Maneuver Center of Excellence (MCoE), the Fires Center of Excellence (FCoE), the Maneuver Capabilities Development Integration Directorate (MCDID), the Science and Technology (S&T) community, industry partners or the acquisition workforce that may provide the Soldier or Squad increased capability to "fight, win and survive, day and night, in a multi- domain environment now and tomorrow." This project also allows pursuit of technology breakthroughs that challenge current technical solutions and have the potential for providing increased Soldier performance. This project focuses on developing component technologies and representative prototype systems for Soldier portable precision targeting devices to continue improvements to system performance while reducing size, weight, and power required by those systems. The effort will consider emerging Micro-Electronic Modules (MEMs) technologies for improved efficiency and performance. Efforts will improve the Soldier's ability to precisely locate and designate targets across a broader range of operating environments, including all weather conditions, GPS-contested environments using active and passive methodologies and technologies. Component technology development will precede integration into specific systems and will include improved Precision Azimuth and Vertical Angle Measurement (PAVAM) devices; solid-state, improved lasers for range finding/designation/markings; electro-optical sensors such as infrared, near-infrared, ultra-violet, and visible spectrum imagers; sensor and data fusion; laser designator spot detection and imaging; integration of advanced power management technologies. Funding in this project aligns with Army's priorities in support of the National Defense Strategy.

<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022 Base</b>	<b>FY 2022 OCO</b>	<b>FY 2022 Total</b>
Previous President's Budget	200.791	24.316	22.282	-	22.282
Current President's Budget	192.530	15.429	18.000	-	18.000
Total Adjustments	-8.261	-8.887	-4.282	-	-4.282
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-8.000			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-8.261	-0.887			
• Adjustments to Budget Years	-	-	-4.282	-	-4.282



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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army										<b>Date:</b> May 2021		
<b>Appropriation/Budget Activity</b> 2040 / 4					<b>R-1 Program Element (Number/Name)</b> PE 0603774A / <i>Night Vision Systems Advanced Development</i>				<b>Project (Number/Name)</b> BQ5 / <i>Visual Augmentation System Advanced Development</i>			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022 Base</b>	<b>FY 2022 OCO</b>	<b>FY 2022 Total</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>FY 2026</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
BQ5: <i>Visual Augmentation System Advanced Development</i>	-	185.328	5.475	11.699	-	11.699	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

This project evaluates and integrates technologies and representative prototype systems transitioning from the Science and Technology (S&T) stage. It focuses on developing the next generation augmented vision and situational awareness system that provides the Soldier with the ability to fight, rehearse, train and win during multi-domain operations. Funded efforts will accelerate the development of components, terrain shared coordinate data and processing, algorithms including machine learning/artificial intelligence and demonstrations in support of the next generation augmented vision and situational awareness system. Efforts will provide rapid decision making and targeting capabilities with the integration of external video and data sources such as weapon sights, unmanned air and ground vehicles and other data sources enabled by tactical cloud package and advanced network services. This project will provide data driven analytics to optimize unit performance and enhance lethality and to enable Synthetic Training Environment (STE) squad capability to perform live mixed reality training and rehearsing. This project includes costs for efforts associated with movement of information and high level processing, integration, and interface of products with the Soldiers' head, body, weapon, and transportation. This is a priority of the Secretary's Close Combat Lethality Task Force. Funding in this project aligns with the Army's priorities in support of the National Defense Strategy. This project supports the Soldier Lethality Cross Functional Team.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
<b>Title:</b> Heads Up Display (HUD)	185.328	5.475	11.107
<b>Description:</b> Integrated Visual Augmentation System (IVAS) HUD provides a first generation single platform for Soldier/Marines to fight, rehearse, and train in day and night that provides increased lethality, mobility, and situational awareness necessary to achieve overmatch against our current and future adversaries.			
<b>FY 2021 Plans:</b> Completed Capability Set 4 design, Cold Weather Test, Tropic Weather Test, and Soldier Touch Point 4 (30 April 2021). Will complete all Developmental Testing and preparations for Initial Operational Test and Evaluation (August 2021).			
<b>FY 2022 Plans:</b> Develop technology improvements to IVAS focused on sensor performance (low light and high resolution binocular thermal), wireless communications, reduced weight, and improved usability (Soldier Authentication). Soldier Authentication capability was developed by the Government and improves Soldier experience and security. Develop advanced artificial intelligence/machine learning mission planning and performance tools using the IVAS Software Development Kits (SDKs). These tools will extend IVAS capabilities and be driven by Soldier Centered Design activities. Begin market research and technology assessments in			

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603774A / <i>Night Vision Systems Advanced Development</i>	<b>Project (Number/Name)</b> BQ5 / <i>Visual Augmentation System Advanced Development</i>

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
order to establish the acquisition strategy for the second generation of IVAS capability with consideration for classified usage, reduced size/weight and greater combat helmet and CBRNE integration. <b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> Funding increased from \$5.475 million in FY21 to \$11.699 million in FY22 due to \$10M reduction in FY21 budget enactment.			
<b>Title:</b> SBIR/STTR Transfer <b>Description:</b> Funding transferred in accordance with Title 15 USC 638 <b>FY 2022 Plans:</b> Funding transferred in accordance with Title 15 USC 638 <b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> Funding transferred in accordance with Title 15 USC 638	-	-	0.592
<b>Accomplishments/Planned Programs Subtotals</b>	185.328	5.475	11.699

<b>C. Other Program Funding Summary (\$ in Millions)</b>											
<u>Line Item</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022</u> <u>Base</u>	<u>FY 2022</u> <u>OCO</u>	<u>FY 2022</u> <u>Total</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>FY 2026</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• K36402: <i>IVAS/Heads Up Display</i>	-	670.476	853.864	-	853.864	-	-	-	-	-	-
• BQ6: <i>Visual Augmentation System Eng Dev</i>	60.599	7.495	4.934	-	4.934	-	-	-	-	-	-

**Remarks**

**D. Acquisition Strategy**

This project utilizes competitively awarded contracts using best value source selection procedures.

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army** **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603774A / <i>Night Vision Systems Advanced Development</i>	<b>Project (Number/Name)</b> BQ5 / <i>Visual Augmentation System Advanced Development</i>
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<b>Management Services (\$ in Millions)</b>				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Program Management	MIPR	VARIOUS : VARIOUS	-	-		2.697		0.335	Nov 2021	-		0.335	0.000	3.032	-
<b>Subtotal</b>			-	-		2.697		0.335		-		0.335	0.000	3.032	N/A

<b>Product Development (\$ in Millions)</b>				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Heads Up Display (HUD)	C/FFP	Microsoft : Redmond, WA	-	185.328	Mar 2020	-		-		-		-	0.000	185.328	-
Heads Up Display (HUD)	TBD	To Be Determined : To Be Determined	-	-		-		10.180		-		10.180	0.000	10.180	-
<b>Subtotal</b>			-	185.328		-		10.180		-		10.180	0.000	195.508	N/A

**Remarks**  
For FY 2022, Product Development of the Heads Up Display (HUD) includes: binocular thermal development, low light sensor enhancements, and Mission planning/execution Tools (App development).

<b>Support (\$ in Millions)</b>				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Matrix Support	MIPR	NVESD : Fort Belvoir, Virginia 22060	-	-		2.778	Nov 2020	1.184	Nov 2021	-		1.184	0.000	3.962	-
<b>Subtotal</b>			-	-		2.778		1.184		-		1.184	0.000	3.962	N/A

			Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
<b>Project Cost Totals</b>			-	185.328	5.475	11.699	-	11.699	0.000	202.502	N/A

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<b>Exhibit R-3, RDT&amp;E Project Cost Analysis:</b> PB 2022 Army	<b>Date:</b> May 2021
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<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603774A / <i>Night Vision Systems Advanced Development</i>	<b>Project (Number/Name)</b> BQ5 / <i>Visual Augmentation System Advanced Development</i>
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	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
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<b>Remarks</b>	
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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2022 Army</b>			<b>Date: May 2021</b>
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603774A / <i>Night Vision Systems Advanced Development</i>	<b>Project (Number/Name)</b> BQ5 / <i>Visual Augmentation System Advanced Development</i>	

Event Name	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Heads Up Display (HUD)	Development																											
Technology Improvements to First Generation HUD					Development																							
Second Generation HUD																	Development											

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603774A / <i>Night Vision Systems Advanced Development</i>	<b>Project (Number/Name)</b> BQ5 / <i>Visual Augmentation System Advanced Development</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Heads Up Display (HUD)	4	2018	4	2020
Technology Improvements to First Generation HUD	1	2021	4	2023
Second Generation HUD	1	2024	4	2026

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army										<b>Date:</b> May 2021		
<b>Appropriation/Budget Activity</b> 2040 / 4					<b>R-1 Program Element (Number/Name)</b> PE 0603774A / <i>Night Vision Systems Advanced Development</i>				<b>Project (Number/Name)</b> VT7 / <i>Soldier Maneuver Sensors - Adv Dev</i>			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022 Base</b>	<b>FY 2022 OCO</b>	<b>FY 2022 Total</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>FY 2026</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
VT7: <i>Soldier Maneuver Sensors - Adv Dev</i>	-	5.780	7.289	3.777	-	3.777	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

This project enables development of emerging capabilities for the maneuver force, that are envisioned by the Soldier Lethality Cross Functional Team, the Maneuver Center of Excellence (MCoE), the Maneuver Capabilities Development Integration Directorate (MCDID), the Science and Technology (S&T) community, industry partners or the acquisition workforce that may provide the Soldier or Squad increased capability to "fight, win and survive, day and night, in a multi-domain environment now and tomorrow". This project also allows pursuit of technology breakthroughs that challenge current technical solutions and have the potential for providing increased Soldier performance. This effort focuses on capabilities that enable modernization of Soldier sensor and laser devices, including digital features and enhanced solutions including maneuver capabilities to detect, recognize and identify targets, and to provide target acquisition and handoff capabilities to mitigate threats. The integration of higher performing multi-spectral sensors with smart processing will provide adjusted weapon sight reticles and leverage network connectivity for improved situational awareness/understanding. Additional project capabilities include advanced optical components and assemblies and techniques for signature management, resiliency across the electromagnetic spectrum, and integration of a modular design structure for target acquisition applications including support for wireless data transfer, passive range determination, technologies for working in a GPS contested environment, advanced GPS replacement technologies and mitigation of manned and unmanned threat sensor systems. This project supports efforts to evaluate and integrate technologies and representative prototype systems including Micro Electronics Modules (MEMS) technology with improved size, weight and power for development of modernized Soldier sensor capabilities transitioning from the S&T stage to operational use. This project includes costs for efforts associated with development, certification, verification and validation of interface products into the Adaptive Squad Architecture (ASA). This project also includes development of tools and emulators of ASA components. Funding in this project aligns with Army's priorities in support of the National Defense Strategy.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
<b>Title:</b> Soldier Enhanced Sensing Capabilities	2.932	1.490	1.230
<b>Description:</b> Soldier Enhanced Sensing Capabilities provides the next generation vision capabilities for day and night that will reduce the Soldier's burden and allow hands free operation. Soldier Enhanced Sensing Capabilities will provide automatic adjustment of imagery and matched sensor fields of view. This effort will further enhancement of day/night Rapid Target Acquisition (RTA) capabilities by interfacing with Family of Weapon Sights-Individual (FWS-I), day/night data display for the Soldier Network Warrior End User Device/Computer (EUD) and the Integrated Vision Augmentation System (IVAS). This effort considers methods of obtaining range estimates without the use of active laser devices and extends the ability to send/receive data to the EUD to support advanced EUD applications by processing of sensor video, integrating it with external data sources, and producing advanced processed imagery with overlay data display. This effort will further work to reduce size, weight and power of sensor and laser components including consideration of MEMS technology and considers IVAS successes to explore			

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603774A / <i>Night Vision Systems Advanced Development</i>	<b>Project (Number/Name)</b> VT7 / <i>Soldier Maneuver Sensors - Adv Dev</i>

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
<p>integrated digital, low profile, conformal day/night displays. This effort considers alternatives to potentially replace the aging fleet of fielded night vision devices with a digital Near-Infrared (NIR) device, a wide field of view device and/or a white phosphor night vision device.</p> <p><b>FY 2021 Plans:</b> For FY 2021, in addition to continuing unfinished work initiated in FY 2020, integration and enhancements are expected in the Family of Weapon Sights and Small Tactical Optical Rifle Mounted programs of record. Migration from an Intra Soldier Wireless (ISW) 128-bit encryption to a 256-bit encryption solution and ultimately to an NSA certified 256-bit solution will be evaluated and appropriately acted upon for all Soldier Maneuver and Precision Targeting, ENVG-B employs Augmented Reality (AR) and Machine Learning (ML) capabilities. Investments are expected to solidify and enhance the supply of organic light emitting diodes for existing and emerging programs while work continues on advanced displays including waveguides and projection systems. Investments continue in multi-spectral devices that provide Soldiers capabilities beyond near peer adversaries.</p> <p><b>FY 2022 Plans:</b> In addition to continuing unfinished work initiated in FY 2021, wireless integration and enhancements are expected in the Family of Weapon Sights and Small Tactical Optical Rifle Mounted programs of record including integration and evaluation of Intra Soldier Wireless (ISW) 256-bit encryption. In addition, NSA certified radio modules will be evaluated and considered for integration. FY22 includes technology development to improve robustness of the Augmented Reality (AR), Artificial Intelligence (AI) and Machine Learning (ML) capabilities in ENVG-B. Investments are expected to solidify and enhance the supply of organic light emitting diodes for existing and emerging programs while work continues on advanced displays including waveguides and projection systems. Investments continue in multi-spectral devices that provide Soldiers capabilities beyond near peer adversaries and help to determine the capabilities featured in the Night Vision Goggles-Next.</p> <p><b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> FY 2021 to FY 2022 slight decrease as component technologies have matured and synchronized with IVAS resources.</p>			
<p><b>Title:</b> Target Acquisition Laser Capabilities</p> <p><b>Description:</b> Target Acquisition Capabilities develops modular laser components and representative prototype systems to support target acquisition for pointing, ranging, target hand-off, detection and mitigation of threat sensors. This effort continues to explore non-standard electro-magnetic spectrum waveforms for exploitation in Soldier borne devices. This effort furthers development of a common laser range finding core for fire control and other laser capabilities based on Squad member Table of Organization and Equipment (TOE) position. Modules will be developed with full documentation, including specifications and interface control documents such that they support the Adaptive Soldier Architecture. This effort develops target acquisition capabilities to include, but is not limited to, augmented reality cues within target locators and target handoff capabilities that are less detectable, conducted wirelessly moving towards a covert target handoff, pointing, range finding capability, and technologies that enable self</p>	2.848	2.563	0.720



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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603774A / <i>Night Vision Systems Advanced Development</i>	<b>Project (Number/Name)</b> VT7 / <i>Soldier Maneuver Sensors - Adv Dev</i>

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
<p>and target location in a GPS contested environment. This effort also includes individual Soldier laser event recording and laser warning devices. This effort enables refinement of pre-shot threat detection systems.</p> <p><b>FY 2021 Plans:</b> For FY 2021, resources will be used for development of modular laser components and prototype devices that leverage interface control documents and the Adaptive Squad Architecture. Integration of interfaces such as Intra-Soldier Wireless and an Intelligent/Powered Rail will support a modular system-of-systems approach for target acquisition, pointing, ranging, and target hand-off.</p> <p><b>FY 2022 Plans:</b> Resources will be used for development of modular components and prototype devices that leverage interface control documents and the Adaptive Squad Architecture. Integration of interfaces such as Intra-Soldier Wireless and an Intelligent/Powered Weapons Rails will support a modular system-of-systems approach for target acquisition, pointing, ranging, and target hand-off.</p> <p><b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> FY 2021 to FY 2022 decrease funding as laser capabilities integrated into Advanced Sensor Development will transition to RDTE 6.5 EMD.</p> <p><b>Title:</b> Advanced Sensor Development</p> <p><b>Description:</b> Advanced Sensor Development is the next generation weapon target acquisition system for use on Next Generation Squad Weapons (NGSW). The increased Advanced Sensor Development of all digital capabilities includes, but is not limited to: wireless remote weapon sight viewing compatibility with the emerging goggle solutions Night Vision Systems (NVS) including Integrated Vision Augmentation System (IVAS)) to provide a heads up Rapid Target Acquisition (RTA) capability; wireless interface with the future Soldier processing component to exchange Mission Command information; day and night capabilities to image in multiple spectral bands; target interrogation; laser range finding; target handoff with coded sources; adjusted and displaced reticule; facial recognition capabilities at tactical ranges and connectivity to the intelligent / powered weapon rail.</p> <p><b>FY 2021 Plans:</b> Plans to integrate advanced capabilities, employ system engineering principals in support of the Adaptive Squad Architecture and refine capability emergence from lab to Program Management responsibility.</p> <p><b>FY 2022 Plans:</b> Continue development of Advanced Weapon Sight for integration with the Next Gen Squad Weapon.</p> <p><b>FY 2021 to FY 2022 Increase/Decrease Statement:</b></p>	-	2.596	0.636

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603774A / <i>Night Vision Systems Advanced Development</i>	<b>Project (Number/Name)</b> VT7 / <i>Soldier Maneuver Sensors - Adv Dev</i>

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
FY 2021 to FY 2022 increase in required funding as IVAS matured some component technology ahead of schedule. Funding increase also represents a re-alignment of funding line dollars to meet highest priority requirements.			
<b>Title:</b> Adaptive Squad Architecture (ASA) Tools	-	0.640	1.191
<b>Description:</b> This project contains tools and services that support the Adaptive Squad Architecture (ASA) integration effort. This project considers emerging products as well as legacy products for size, weight and power efficiencies. This project develops interface control documentation for integration into the ASA, Next Gen Squad Weapon power / intelligent rail and enables upgrades, enhancements, certifications, validation, verification of evolving Intra-Soldier Wireless products. ASA will pursue a common weapon remote to operate all weapon enablers. This project supports certification of new ISW encryption solutions requisite re-certification needs, ISW enhancement and costs associated with ISW bug fixes.			
<b>FY 2021 Plans:</b> Strategically plan for Soldier Integration Facility and ASA support, NGSW integration and ISW growth.			
<b>FY 2022 Plans:</b> Plans to integrate advanced capabilities, employ system engineering principals in support of the Adaptive Squad Architecture and refine capability emerging from Science and Technology to Program Management responsibility. Strategically plan for Soldier Integration Facility and ASA support, NGSW integration and ISW growth.			
<b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> FY 2022 increase is due to ASA development in FY 2021 that continues to identify and capture resources required for enduring support to the ASA mission. Funding increase also represents a re-alignment of funding line dollars to meet highest priority requirements.			
<b>Accomplishments/Planned Programs Subtotals</b>	5.780	7.289	3.777

<b>C. Other Program Funding Summary (\$ in Millions)</b>											
<u>Line Item</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022</u> <u>Base</u>	<u>FY 2022</u> <u>OCO</u>	<u>FY 2022</u> <u>Total</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>FY 2026</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• L67: <i>Soldier Night Vision Devices</i>	31.118	12.318	32.747	-	32.747	-	-	-	-	-	-
• K22002: <i>FWS-INDIVIDUAL</i>	81.541	83.820	147.271	-	147.271	-	-	-	-	-	-
• K22003: <i>FWS-CREW SERVED</i>	-	-	25.673	-	25.673	-	-	-	-	-	-
• K22004: <i>FWS-SNIPER</i>	-	2.569	11.201	-	11.201	-	-	-	-	-	-
• B53800: <i>Laser Target Locator Systems</i>	30.382	14.347	20.571	-	20.571	-	-	-	-	-	-

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army	<b>Date:</b> May 2021
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<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603774A / <i>Night Vision Systems Advanced Development</i>	<b>Project (Number/Name)</b> VT7 / <i>Soldier Maneuver Sensors - Adv Dev</i>
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**C. Other Program Funding Summary (\$ in Millions)**

<u>Line Item</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022</u> <u>Base</u>	<u>FY 2022</u> <u>OCO</u>	<u>FY 2022</u> <u>Total</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>FY 2026</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• K35110: <i>Small Tactical Optical Rifle Mounted MLRF</i>	22.623	7.715	21.103	-	21.103	-	-	-	-	-	-
• K36402: <i>IVAS/Heads Up Display</i>	-	670.476	853.864	-	853.864	-	-	-	-	-	-
• BQ5: <i>Visual Augmentation System Advanced Development</i>	185.328	5.475	11.699	-	11.699	-	-	-	-	-	-
• BQ6: <i>Visual Augmentation System Eng Dev</i>	60.599	7.495	4.934	-	4.934	-	-	-	-	-	-
• K36400: <i>Helmet Mounted Enhanced Vision Devices</i>	50.632	183.000	217.906	-	217.906	-	-	-	-	-	-

**Remarks**

**D. Acquisition Strategy**

The various developmental programs in this Project continue to exercise competitively awarded contracts using best value source selection procedures.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army												Date: May 2021			
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)							
2040 / 4				PE 0603774A / Night Vision Systems Advanced Development				VT7 / Soldier Maneuver Sensors - Adv Dev							
<b>Management Services (\$ in Millions)</b>				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Management	MIPR	Various : Various	0.406	0.725	Dec 2019	0.666	Feb 2021	0.350	Dec 2021	-		0.350	Continuing	Continuing	-
<b>Subtotal</b>			0.406	0.725		0.666		0.350		-		0.350	Continuing	Continuing	N/A
<b>Product Development (\$ in Millions)</b>				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Soldier Enhanced Sensing Capabilities	MIPR	NVESD : FT BELVOIR, VA	5.262	1.891	Feb 2020	1.490	Mar 2021	1.230	Jan 2022	-		1.230	Continuing	Continuing	-
Target Acquisition Laser Capabilities	MIPR	NVESD : FT BELVOIR, VA	1.023	1.806	Jan 2020	2.353	Dec 2020	0.720	Jan 2022	-		0.720	Continuing	Continuing	-
Advanced Sensor Development	TBD	TBD : TBD	-	-		2.040	Mar 2021	0.136	Jan 2022	-		0.136	Continuing	Continuing	-
Adaptive Squad Architecture (ASA) Tools	TBD	TBD : TBD	-	-		0.389	Mar 2021	1.191	Jan 2022	-		1.191	Continuing	Continuing	-
<b>Subtotal</b>			6.285	3.697		6.272		3.277		-		3.277	Continuing	Continuing	N/A
<b>Support (\$ in Millions)</b>				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Matrix Support	MIPR	NVESD : FT BELVOIR, VA	0.381	1.358	Jan 2020	0.351	Mar 2021	0.150	Dec 2021	-		0.150	Continuing	Continuing	-
<b>Subtotal</b>			0.381	1.358		0.351		0.150		-		0.150	Continuing	Continuing	N/A
<b>Project Cost Totals</b>			7.072	5.780		7.289		3.777		-		3.777	Continuing	Continuing	N/A
<b>Remarks</b>															

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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2022 Army</b>			<b>Date: May 2021</b>		
<b>Appropriation/Budget Activity</b> 2040 / 4		<b>R-1 Program Element (Number/Name)</b> PE 0603774A / <i>Night Vision Systems Advan</i> <i>ced Development</i>		<b>Project (Number/Name)</b> VT7 / <i>Soldier Maneuver Sensors - Adv Dev</i>	

Event Name	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Advanced Sensor Development	Development																											
Target Acquisition Laser Capabilities					Development																							
Soldier Enhanced Sensing Capabilities	Development																											
Adaptive Squad Architecture (ASA) Tools					Development				Development																			

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<b>Exhibit R-4A, RDT&amp;E Schedule Details: PB 2022 Army</b>		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603774A / <i>Night Vision Systems Advanced Development</i>	<b>Project (Number/Name)</b> VT7 / <i>Soldier Maneuver Sensors - Adv Dev</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Advanced Sensor Development	1	2019	4	2022
Target Acquisition Laser Capabilities	1	2019	4	2026
Soldier Enhanced Sensing Capabilities	1	2019	4	2026
Adaptive Squad Architecture (ASA) Tools	1	2021	4	2026

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army										<b>Date:</b> May 2021		
<b>Appropriation/Budget Activity</b> 2040 / 4					<b>R-1 Program Element (Number/Name)</b> PE 0603774A / <i>Night Vision Systems Advanced Development</i>				<b>Project (Number/Name)</b> VT8 / <i>SOLDIER PRECISION TARGETING DEVICES - ADV DEV</i>			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022 Base</b>	<b>FY 2022 OCO</b>	<b>FY 2022 Total</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>FY 2026</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
VT8: <i>SOLDIER PRECISION TARGETING DEVICES - ADV DEV</i>	-	1.422	2.665	2.524	-	2.524	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

This project enables development of emerging capabilities for the maneuvers and fires community, that are envisioned by the Soldier Lethality Cross Functional Team, the Maneuver Center of Excellence (MCoE), the Fires Center of Excellence (FCoE), the Maneuver Capabilities Development Integration Directorate (MCDID), the Science and Technology (S&T) community, industry partners or the acquisition workforce that may provide the Soldier or Squad increased capability to "fight, win and survive, day and night, in a multi-domain environment now and tomorrow." This project also allows pursuit of technology breakthroughs that challenge current technical solutions and have the potential for providing increased Soldier performance. This project focuses on developing component technologies and representative prototype systems for Soldier portable precision targeting devices to continue improvements to system performance while reducing size, weight, and power required by those systems. The effort will consider emerging Micro-Electronic Modules (MEMs) technologies for improved efficiency and performance. Efforts will improve the Soldier's ability to precisely locate and designate targets across a broader range of operating environments, including all weather conditions, GPS-contested environments using active and passive methodologies and technologies. Component technology development will precede integration into specific systems and will include improved Precision Azimuth and Vertical Angle Measurement (PAVAM) devices; solid-state, improved lasers for range finding/designation/markings; electro-optical sensors such as infrared, near-infrared, ultra-violet, and visible spectrum imagers; sensor and data fusion; laser designator spot detection and imaging; integration of advanced power management technologies. Funding in this project aligns with Army's priorities in support of the National Defense Strategy.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
<b>Title:</b> Precision Pointing and Navigation Component Development	1.422	2.665	2.524
<b>Description:</b> This project supports development of advanced components and prototype systems for Soldier-borne precision targeting devices. Dismounted Soldiers will have the capability to rapidly acquire, accurately locate, positively identify, and precisely designate targets and battlefield threats 24/7, across a broader range of operating environments such as in all weather conditions, in GPS-contested conditions using active and passive methodologies and technologies.			
<b>FY 2021 Plans:</b> FY 2021 resources will be used for development of component technologies and initial sub-system integration for Precision Azimuth and Vertical Angle Measurement (PAVAM) devices with reduced size, weight, and power. Additionally, FY 2021 resources will continue integration of M-Code into Dismounted Fires systems to improve operational capabilities in a GPS-contested environment.			
<b>FY 2022 Plans:</b>			

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603774A / <i>Night Vision Systems Advanced Development</i>	<b>Project (Number/Name)</b> VT8 / <i>SOLDIER PRECISION TARGETING DEVICES - ADV DEV</i>

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
Resources will continue the development of component technologies and mature sub-system integration for Precision Azimuth and Vertical Angle Measurement (PAVAM) devices to achieve reduced size, weight and power. These resources will also continue to develop technologies that allow precision targeting systems to operate in GPS-contested environments.			
<b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> FY 2022 decrease is due to a minor change in funding.			
<b>Accomplishments/Planned Programs Subtotals</b>	1.422	2.665	2.524

<b>C. Other Program Funding Summary (\$ in Millions)</b>											
<b>Line Item</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022 Base</b>	<b>FY 2022 OCO</b>	<b>FY 2022 Total</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>FY 2026</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
• L79: <i>Joint Effects Targeting Systems (JETS)</i>	6.146	5.363	5.116	-	5.116	-	-	-	-	-	-
• K32101: <i>JOINT EFFECTS TARGETING SYSTEM (JETS)</i>	25.330	54.206	62.082	-	62.082	-	-	-	-	-	-
• KA3100: <i>Mod Of In-Svc Equip (LLDR)</i>	6.044	-	-	-	-	-	-	-	-	-	-

**Remarks**

**D. Acquisition Strategy**

The various developmental programs in this project continue to exercise competitively awarded contracts using best value source selection procedures.



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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army												Date: May 2021			
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)							
2040 / 4				PE 0603774A / Night Vision Systems Advanced Development				VT8 / SOLDIER PRECISION TARGETING DEVICES - ADV DEV							
<b>Management Services (\$ in Millions)</b>				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Management	MIPR	PM SSL : Ft. Belvoir, VA 22060	-	0.041	Sep 2020	0.089	Feb 2021	0.090	Nov 2021	-		0.090	Continuing	Continuing	-
<b>Subtotal</b>			-	0.041		0.089		0.090		-		0.090	Continuing	Continuing	N/A
<b>Product Development (\$ in Millions)</b>				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Precision Pointing and Navigation	C/FFP	Various : Various	-	1.314	Mar 2020	2.102	Mar 2021	2.195	Jan 2022	-		2.195	Continuing	Continuing	-
<b>Subtotal</b>			-	1.314		2.102		2.195		-		2.195	Continuing	Continuing	N/A
<b>Support (\$ in Millions)</b>				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Matrix Support	MIPR	NVESD : Ft. Belvoir, VA 22060	-	0.067	Apr 2020	0.028	Feb 2021	0.056	Nov 2021	-		0.056	Continuing	Continuing	-
Science and Engineering Support	SS/CPFF	Johns Hopkins University : Laurel, MD	-	-		0.446	Apr 2021	0.183	Feb 2022	-		0.183	Continuing	Continuing	-
<b>Subtotal</b>			-	0.067		0.474		0.239		-		0.239	Continuing	Continuing	N/A
<b>Project Cost Totals</b>			-	1.422		2.665		2.524		-		2.524	Continuing	Continuing	N/A
<b>Remarks</b>															

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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2022 Army</b>			<b>Date: May 2021</b>
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603774A / <i>Night Vision Systems Advanced Development</i>	<b>Project (Number/Name)</b> VT8 / <i>SOLDIER PRECISION TARGETING DEVICES - ADV DEV</i>	

Event Name	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Precision Pointing and Navigation Development																												

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603774A / <i>Night Vision Systems Advanced Development</i>	<b>Project (Number/Name)</b> VT8 / <i>SOLDIER PRECISION TARGETING DEVICES - ADV DEV</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Precision Pointing and Navigation Development	3	2020	4	2026

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**Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Army** **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040: Research, Development, Test & Evaluation, Army / BA 4: Advanced Component Development & Prototypes (ACD&P)	<b>R-1 Program Element (Number/Name)</b> PE 0603779A / Environmental Quality Technology - Dem/Val
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	-	19.089	20.906	11.921	-	11.921	-	-	-	-	-	-
035: National Defense Cntr For Enviro Excellence	-	6.345	8.086	5.313	-	5.313	-	-	-	-	-	-
E21: Environmental Quality Technology Dem/Val	-	12.744	12.820	6.608	-	6.608	-	-	-	-	-	-

**A. Mission Description and Budget Item Justification**

There is broad potential application for environmental quality technology (EQT) to be applied to multiple Army weapon systems and installations. However, technology must be demonstrated and validated (total ownership cost and performance data identified) before potential users will consider exploiting it. This Program Element (PE) includes Projects focused on validating the general military utility or cost reduction potential of technology when applied to different types of infrastructure, military equipment or techniques. It may include validations and proof-of-principle demonstrations in field exercises to evaluate upgrades or provide new operational capabilities. The validation of technologies will be in as realistic an operating environment as possible to assess performance or cost reduction potential. EQT demonstration/validation is systemic and applicable across Department of Army sites and installation problems (e.g. unexploded ordnance detection and discrimination). This PE supports the Army's top modernization priorities by addressing potential obsolescence of legacy materials and current and emerging impacts on human health and the environment. All work is endorsed by potential users and supported by a state-of-the-art assessment to determine when the technology can transition to the user for implementation.

**B. Program Change Summary (\$ in Millions)**

	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022 Base</u>	<u>FY 2022 OCO</u>	<u>FY 2022 Total</u>
Previous President's Budget	19.561	13.387	12.166	-	12.166
Current President's Budget	19.089	20.906	11.921	-	11.921
Total Adjustments	-0.472	7.519	-0.245	-	-0.245
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	8.000			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.472	-0.481			
• Adjustments to Budget Years	-	-	-0.245	-	-0.245

**Congressional Add Details (\$ in Millions, and Includes General Reductions)**

**Project:** 035: National Defense Cntr For Enviro Excellence

FY 2020	FY 2021

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2022 Army **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040: <i>Research, Development, Test &amp; Evaluation, Army / BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0603779A / <i>Environmental Quality Technology - Dem/Val</i>
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<b>Congressional Add Details (\$ in Millions, and Includes General Reductions)</b>	<b>FY 2020</b>	<b>FY 2021</b>
Congressional Add: <i>Program increase - biopolymers for military infrastructure</i>	2.853	3.000
Congressional Add Subtotals for Project: 035	2.853	3.000
<b>Project:</b> E21: <i>Environmental Quality Technology Dem/Val</i>		
Congressional Add: <i>Environmental quality technology demonstration and validation: Congressional Add - Protective Coatings/ Biopolymers (CCDC)</i>	5.000	-
Congressional Add: <i>Environmental quality technology demonstration and validation: Congressional Add - High Pressure Waterjet Technology (USACE)</i>	-	5.000
Congressional Add Subtotals for Project: E21	5.000	5.000
Congressional Add Totals for all Projects	7.853	8.000

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army										<b>Date:</b> May 2021		
<b>Appropriation/Budget Activity</b> 2040 / 4					<b>R-1 Program Element (Number/Name)</b> PE 0603779A / <i>Environmental Quality Technology - Dem/Val</i>				<b>Project (Number/Name)</b> 035 / <i>National Defense Cntr For Enviro Excellence</i>			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022 Base</b>	<b>FY 2022 OCO</b>	<b>FY 2022 Total</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>FY 2026</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
035: <i>National Defense Cntr For Enviro Excellence</i>	-	6.345	8.086	5.313	-	5.313	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

The National Defense Center for Environmental Excellence (NDCEE) was established by Congress in 1990 with a directive to "serve as a national leadership organization to address high priority environmental problems for the Department of Defense (DoD), other government organizations, and the industrial community." In May 2008, the Program was re-designated from the National Defense Center for Environmental Excellence to the National Defense Center for Energy and Environment to ensure that the Center's mission recognizes and addresses the strategic interdependence of energy and environmental technology requirements within an overall sustainability framework in support of our installations, weapons systems and war fighters. This name change also directly supports the DoD's proactive implementation of Executive Order 13423, "Strengthening Federal Environmental, Energy and Transportation Management." The NDCEE Program has evolved into a national resource for demonstrating, validating and transitioning innovative Environmental, Safety & Occupational Health and Energy (ESOHE) technologies. This Program is managed by the Army on behalf of the Assistant Secretary of Defense for Sustainment.

The United States (U.S.) Army's broadly encompassing and growing mobile, personal and stationary technological requirements include: infrastructure, alternative and synthetic energy, training lands, emerging contaminants, transportation, systems integration, personnel well-being, and others. Further, to train as we fight, validated ESOHE technologies need to be available and implemented at Army installations. The NDCEE will continue to demonstrate, validate, and transfer these technologies supporting our integrated environment, energy, safety, occupational health and energy objectives to enable mission, readiness, innovation, lethality and modernization to ensure our Soldiers maintain a technological advantage over our adversaries.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
<b>Title:</b> Conduct demonstration/validation of environmentally acceptable technologies that enhance military readiness and reduce production, operating, and/or disposal costs.	3.365	4.886	5.109
<b>Description:</b> NDCEE supports the demonstration and validation of mature (BA4) environment, safety, occupational health, and energy technologies that support the mission requirements. The objective is to invest in innovative technologies that support military mission/readiness, employ a high degree of technical fidelity, have a high potential for transition success, and align with modernization goals.			
<b>FY 2021 Plans:</b> Will conduct demonstration/validation of environment, safety, occupational health, and energy technologies that support military mission/readiness, employ a high degree of technical fidelity, have a high potential for transition success, and align with			

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603779A / <i>Environmental Quality Technology - Dem/Val</i>	<b>Project (Number/Name)</b> 035 / <i>National Defense Cntr For Environmental Excellence</i>

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
modernization goals. Will conduct project selection process for potential FY 2022 new starts. Technologies will be selected by the NDCEE project selection committee and approved by the NDCEE Lead Agent.  <b>FY 2022 Plans:</b> Funding will be provided for projects selected the previous year and still require funds; projects are generally completed within two years. The NDCEE Program Management Office will coordinate the project selection process for potential FY 2022 new project starts. Technologies will be selected by the NDCEE project selection committee and approved by the NDCEE Executive Agent.  <b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> Adjusted for Inflation			
<b>Title:</b> NDCEE Government program management during contract negotiations and during project formulation, execution, and technology transfer.  <b>Description:</b> Funds the NDCEE Government program management during comprehensive NDCEE lifecycle, including project cultivation and identification, screening, selection, execution, and technology transition.  <b>FY 2021 Plans:</b> Will fund the NDCEE program management during comprehensive NDCEE lifecycle, including project cultivation and identification, screening, selection, execution, reporting, and technology transfer. Includes contracting office support for contract closeouts, travel to conduct program management oversight, and program coordination and education to DoD stakeholders.  <b>FY 2022 Plans:</b> Will fund the NDCEE program management during comprehensive NDCEE lifecycle, including project cultivation and identification, screening, selection, execution, reporting, and technology transfer. Includes contracting office support for contract closeouts, travel to conduct program management oversight, and program coordination and education to DoD stakeholders.  <b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> Adjusted for Inflation	0.127	0.200	0.204
<b>Accomplishments/Planned Programs Subtotals</b>	3.492	5.086	5.313

	<b>FY 2020</b>	<b>FY 2021</b>
<b>Congressional Add:</b> Program increase - biopolymers for military infrastructure	2.853	3.000
<b>FY 2020 Accomplishments:</b> Biopolymers for military infrastructure		
<b>FY 2021 Plans:</b> Biopolymers for military infrastructure		
<b>Congressional Adds Subtotals</b>	2.853	3.000

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603779A / <i>Environmental Quality Technology - Dem/Val</i>	<b>Project (Number/Name)</b> 035 / <i>National Defense Cntr For Enviro Excellence</i>

**C. Other Program Funding Summary (\$ in Millions)**

N/A

**Remarks**

**D. Acquisition Strategy**

The NDCEE is a national asset focused on DoD applications that include technology transfer to appropriate DoD transition partners. The management strategy for the NDCEE ensures that all projects have a potential multi-service benefit and have a high potential for transition success. At the strategic level, the NDCEE Executive Advisory Board (EAB) is chaired by the DoD NDCEE Lead Agent on behalf of the Assistant Secretary of Defense for Sustainment and is representative of the services and DoD. The EAB and the Program Director are supported by the NDCEE Technical Advisory Group (TAG) to help ensure that NDCEE investments are maximized across DoD and the Services. At the tactical level, the three Focus Groups (environment, safety/occupational health, and energy) cultivate and recommend priority projects to the TAG and Project Selection Committee for funding. Transition Partners ensure that NDCEE's investments are carried forward in the next phases of the Research Development Test and Evaluation process, as identified in each funded project's Technology Transition Agreement.

NDCEE projects enable readiness for the Services under increasingly complex and demanding scenarios. The interdependency of national security with energy supply and costs, water supply and costs, environmental resiliency, and human health and safety are clear and NDCEE projects provide forward-looking solutions to these challenges. Failure to further fund and validate promising technologies that are at the mature or Commercial-off-the-Shelf stage, would result in lost modernization opportunities and validation before they go into a military environment. These initiatives need to be carried forward into an operational/realistic testing environment so that they can support mission readiness and training when ultimately fielded to the Services.



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<b>Exhibit R-3, RDT&amp;E Project Cost Analysis: PB 2022 Army</b>												<b>Date: May 2021</b>			
<b>Appropriation/Budget Activity</b> 2040 / 4				<b>R-1 Program Element (Number/Name)</b> PE 0603779A / <i>Environmental Quality Tech nology - Dem/Val</i>					<b>Project (Number/Name)</b> 035 / <i>National Defense Cntr For Enviro Excellence</i>						
<b>Management Services (\$ in Millions)</b>				<b>FY 2020</b>		<b>FY 2021</b>		<b>FY 2022 Base</b>		<b>FY 2022 OCO</b>		<b>FY 2022 Total</b>			
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
Program Management Support	MIPR	AEC : San Antonio, TX	25.106	0.127	Nov 2018	0.200	Nov 2018	0.204	Nov 2018	-		0.204	Continuing	Continuing	Continuing
FY 2020 SBIR/STTR Transfer	TBD	Various : Various	-	-		3.000		-		-		-	0.000	3.000	-
<b>Subtotal</b>			25.106	0.127		3.200		0.204		-		0.204	Continuing	Continuing	N/A
<b>Test and Evaluation (\$ in Millions)</b>				<b>FY 2020</b>		<b>FY 2021</b>		<b>FY 2022 Base</b>		<b>FY 2022 OCO</b>		<b>FY 2022 Total</b>			
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
Development Testing and Evaluation	Various	Various. : Various	40.119	6.218	Nov 2018	4.886	Nov 2018	5.109	Nov 2018	-		5.109	Continuing	Continuing	Continuing
<b>Subtotal</b>			40.119	6.218		4.886		5.109		-		5.109	Continuing	Continuing	N/A
			<b>Prior Years</b>	<b>FY 2020</b>		<b>FY 2021</b>		<b>FY 2022 Base</b>		<b>FY 2022 OCO</b>		<b>FY 2022 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Project Cost Totals</b>			65.225	6.345		8.086		5.313		-		5.313	Continuing	Continuing	N/A
<b>Remarks</b>															

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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2022 Army</b>			<b>Date: May 2021</b>		
<b>Appropriation/Budget Activity</b> 2040 / 4		<b>R-1 Program Element (Number/Name)</b> PE 0603779A / <i>Environmental Quality Technology - Dem/Val</i>		<b>Project (Number/Name)</b> 035 / <i>National Defense Cntr For Enviro Excellence</i>	

Event Name	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
NDCEE Management and Operations (Enduring)																												
NDCEE Env, Safety, Occ Health, and Energy Technology Dem/A																												

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603779A / <i>Environmental Quality Technology - Dem/Val</i>	<b>Project (Number/Name)</b> 035 / <i>National Defense Cntr For Enviro Excellence</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
NDCEE Management and Operations (Enduring)	1	2019	4	2024
NDCEE Env, Safety, Occ Health, and Energy Technology Dem/Val (Enduring)	1	2019	4	2024

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army										<b>Date:</b> May 2021		
<b>Appropriation/Budget Activity</b> 2040 / 4					<b>R-1 Program Element (Number/Name)</b> PE 0603779A / <i>Environmental Quality Technology - Dem/Val</i>				<b>Project (Number/Name)</b> E21 / <i>Environmental Quality Technology Dem/Val</i>			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022 Base</b>	<b>FY 2022 OCO</b>	<b>FY 2022 Total</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>FY 2026</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
E21: <i>Environmental Quality Technology Dem/Val</i>	-	12.744	12.820	6.608	-	6.608	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

This Project supports Advanced Component Development and Prototypes of innovative environmental quality technologies that modernize materials and processes required for current and future operational sustainment and warfighter training capabilities. The Project showcases technologies that increase life safety, reduce Soldier and worker human health risks, enhance readiness and enable mission capabilities of the current and future force with a focus on eliminating the high priority issues associated with hexavalent chromium, cadmium and airborne lead through material substitution. The Project expedites technology transition from the laboratory to operational use by demonstrating modern materials and processes to fulfill or surpass the performance requirements outlined in Material Specifications, Depot Maintenance Work Requirements, Technical Manuals, Drawings and other technical data. Forward-looking materials and processes demonstrated under this project support the Cross Functional Teams and the Army's top modernization priorities by addressing potential obsolescence of legacy materials and current and emerging impacts on human health and the environment. Modernized materials and processes have the additional benefit of reducing future regulatory compliance and cleanup requirements while simultaneously increasing performance and standardization across the Army, resulting in significantly reduced life cycle costs incurred by acquisition, industrial base and installation end users.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
<b>Title:</b> Environmental quality technology demonstration and validation: Toxic Metal Reduction in Surface Finishing of Army Weapon Systems (CCDC)	2.097	3.154	2.439
<b>Description:</b> Increase operational readiness and reduce Soldier and worker human health risks by reducing or eliminating the use of cancer-causing hexavalent chromium, cadmium and associated toxic materials used in surface finishing processes for the current and future force. These Safer Alternatives for Readiness (SAFR) technologies will be used to provide superior corrosion and wear protection for components used on Future Vertical Lift and Next Generation Combat Vehicles and enable increased performance/extended barrel life for Long Range Precision Fire systems.			
<b>FY 2021 Plans:</b> Complete demonstration of cold spray gun barrels with increased barrel life; validate hexavalent chromium-free aluminum anodizing process at pilot scale and demonstrate on relevant aircraft.			
<b>FY 2022 Plans:</b>			

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army		<b>Date:</b> May 2021		
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603779A / <i>Environmental Quality Technology - Dem/Val</i>	<b>Project (Number/Name)</b> E21 / <i>Environmental Quality Technology Dem/Val</i>		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
<p>Will complete fatigue and performance testing needed to approve zinc-nickel alternatives to cadmium in aircraft components; will validate performance of hybrid additive manufacturing techniques using wear resistant materials and high strength alloys to replace hard chrome plating in crew-served machine guns.</p> <p><b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> Funds decrease reflects technology area ramping down toward completion in FY 2023.</p>				
<p><b>Title:</b> Environmental quality technology demonstration and validation: Airborne Lead Reduction from Army Weapon Systems (CCDC)</p> <p><b>Description:</b> Sustain Soldier training readiness, maintain/restore training capability at ranges closed due to dangerous levels of lead exposure and increase life safety and protection of human health on Army installations by reducing or eliminating the use of toxic lead compounds - which are known to cause damage to central nervous, cardiovascular and immune systems with long-term effects for children, as well as potential developmental impacts, including IQ loss, behavioral issues and hearing loss - in rocket and missile propellants and primary explosives (primers/detonators/initiators) for the current and future force. These Safer Alternatives for Readiness (SAFR) will provide a domestic, readily available source for lead-free primary explosives used in all Long Range Precision Fires and Soldier Lethality systems.</p> <p><b>FY 2021 Plans:</b> Will demonstrate lead-free fuze (combining primer and detonator) in hand grenade configuration; will demonstrate lead-free minimum signature rocket propellants in heavy-weight motors.</p> <p><b>FY 2022 Plans:</b> Will demonstrate alternative fuze system using qualified lead-free primary explosives in artillery round configuration; will conduct flight-weight motor testing for lead-free minimum signature rocket propellants.</p> <p><b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> Increase reflects technology area ramping up to include higher fidelity live-fire testing.</p>		1.659	2.232	2.482
<p><b>Title:</b> Environmental quality technology demonstration and validation: Low Global Warming Potential (LGWP) Alternatives to Ozone Depleting Substances (ODS) (CCDC)</p> <p><b>Description:</b> Evaluate low GWP ODS alternatives being developed by industry to assess their toxicity and flammability hazards and verify their acceptability in military unique refrigeration and fire suppression applications. These Safer Alternatives for Readiness (SAFR) technologies will support all Future Vertical Lift and Next Generation Combat Vehicle systems.</p> <p><b>FY 2021 Plans:</b></p>		0.191	0.226	0.235

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army		<b>Date:</b> May 2021		
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603779A / <i>Environmental Quality Technology - Dem/Val</i>	<b>Project (Number/Name)</b> E21 / <i>Environmental Quality Technology Dem/Val</i>		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
<p>Conduct vehicle-scale demonstrations for alternative, low GWP extinguishing agents with high potential to meet safety and performance requirements for occupied crew compartments.</p> <p><b>FY 2022 Plans:</b> Will demonstrate alternative, low GWP refrigerant agents with high potential to meet safety and performance requirements for mobile refrigeration systems.</p> <p><b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> Economic adjustment.</p>				
<p><b>Title:</b> Environmental quality technology demonstration and validation: Insensitive Munitions (IM) Wastewater Treatment (USACE)</p> <p><b>Description:</b> Demonstrate and validate optimized scalable wastewater treatment system basic technology for the destructive treatment of existing and emerging insensitive munitions (IM) contaminated production wastewater generated during Army ammunition plant munitions production.</p> <p><b>FY 2021 Plans:</b> Will install pilot demonstration unit for continuous precipitation and membrane concentration of IM wastewaters at MCAAP. Will work with local authorities to verify release limits and treatment optimization.</p> <p><b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> Decrease reflects early transition of products in FY21.</p>		1.534	0.905	-
<p><b>Title:</b> Environmental quality technology demonstration and validation: Environmental Toolkit for Expeditionary Operations (USACE)</p> <p><b>Description:</b> Conduct pilot-scale demonstration and validation studies to determine the effectiveness of basic technologies/ methods developed for rapidly collecting environmental data in the field for the purposes of reducing impact of environmental requirements on installations. Demonstrate the ability of ETEO software to communicate easily with new, commercially available sensors through simple device driver (with minimal or no development). Assess available chemical databases on the new sensor for their ability to detect and quantify environmental contaminants. Demonstrate the operational ETEO software and sensors at designated locations.</p> <p><b>FY 2021 Plans:</b> Will develop instructional videos for all current ETEO tools and software to streamline training use of ETEO for current and future users. Test and demonstrate a new sensor as a potential replacement for the PET kit. Reduce the amount of consumables</p>		0.794	0.505	0.510

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army		<b>Date:</b> May 2021		
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603779A / <i>Environmental Quality Technology - Dem/Val</i>	<b>Project (Number/Name)</b> E21 / <i>Environmental Quality Technology Dem/Val</i>		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
<p>in the ETEO toolkit. Will demonstrate new auto-fill capabilities in the reporting software to decrease Soldiers time populating Environmental Baseline Surveys.</p> <p><b>FY 2022 Plans:</b> Will perform demonstrations of the ETEO sensor suite and software in austere locations. Will validate kits with USACE Forward Engineering Support Teams and National Guard units.</p> <p><b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> Complete task and finalize transition of product.</p>				
<p><b>Title:</b> Environmental quality technology demonstration and validation: Fate and Risk Evaluation System for Contaminants (FRESCO?)</p> <p><b>Description:</b> FRESCO will ensure Solider readiness through reduction in training range down time. Validation of FRESCO will provide the capability to model and forecast contaminant fate and health risks associated with new military materials in the environment, pursuant to unfilled technology gap identified in DoD Instruction Number 4715.18.</p> <p><b>FY 2021 Plans:</b> Validation of FRESCO will provide the capability to model and forecast contaminant fate and health risks associated with new military materials in the environment, pursuant to unfilled technology gap identified in DoD Instruction Number 4715.18.The FRESCO System will be further validated using existing Army data - the project team will work with our Technology Transition Agreement (TTA) partners to select an applicable demonstration site that will allow us to demonstration and validate the full system features.</p> <p><b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> Task scheduled to complete demonstration/validation and to transition in FY21.</p>		1.469	0.798	-
<p><b>Title:</b> Decontamination Effluent Treatment System (DETS) Demonstration/Validation (USACE)</p> <p><b>Description:</b> Demonstrate and validate the Decontamination Effluent Treatment System (DETS), an optimized scalable system for the treatment of Chemical, Biological, Radioactive, &amp; Nuclear (CBRN) decontamination wastewater, while exploring enhancements to improve performance.</p> <p><b>FY 2022 Plans:</b> Will demonstrate Decontamination Effluent Treatment System and test it on simulants and actual chemical and radiological substrates. In addition, the DETS will be tested on biological constituents.</p> <p><b>FY 2021 to FY 2022 Increase/Decrease Statement:</b></p>		-	-	0.562

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603779A / <i>Environmental Quality Technology - Dem/Val</i>	<b>Project (Number/Name)</b> E21 / <i>Environmental Quality Technology Dem/Val</i>

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
Increase of funds needed to modify system for biological constituents.			
<b>Title:</b> Engineered Technologies for Risk Mitigation and Management of PFOS/PFOA on Army Installations (USACE) <b>Description:</b> Demonstrate and validate technologies such as 3D printed composite structures and advanced materials for remediation and monitoring of PFAS, novel methods for PFAS destruction, rapid risk based classification and characterization computational models, and monitoring and extraction technologies including PFAS sensors. <b>FY 2022 Plans:</b> Will demonstrate capability of PFAS Effluent Treatment System (PETS) to decontaminate existing PFAS contaminated fire suppression infrastructure. <b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> New task needed to address growing impact of PFAS contamination on Army installations.	-	-	0.380
<b>Accomplishments/Planned Programs Subtotals</b>	7.744	7.820	6.608

	<b>FY 2020</b>	<b>FY 2021</b>
<b>Congressional Add:</b> Environmental quality technology demonstration and validation: Congressional Add - Protective Coatings/Biopolymers (CCDC) <b>FY 2020 Accomplishments:</b> Congressional interest item	5.000	-
<b>Congressional Add:</b> Environmental quality technology demonstration and validation: Congressional Add - High Pressure Waterjet Technology (USACE) <b>FY 2021 Plans:</b> Congressional Interest Item	-	5.000
<b>Congressional Adds Subtotals</b>	5.000	5.000

<b>C. Other Program Funding Summary (\$ in Millions)</b>										
<b>Line Item</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022 Base</b>	<b>FY 2022 OCO</b>	<b>FY 2022 Total</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>FY 2026</b>	<b>Cost To Complete Total Cost</b>
• 06I: <i>Environmental Quality Technology Support</i>	0.539	0.428	0.444	-	0.444	-	-	-	-	-
<b>Remarks</b>										



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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603779A / <i>Environmental Quality Technology - Dem/Val</i>	<b>Project (Number/Name)</b> E21 / <i>Environmental Quality Technology Dem/Val</i>

**D. Acquisition Strategy**

The project ultimately transitions successfully demonstrated environmental quality technologies to Army acquisition, industrial base and installation end users. All technology efforts address a valid Army Environmental Requirements and Technology Assessments (AERTA) requirement. Efforts approved by senior Army environmental leadership receive Advanced Component Development and Prototype funding to fully demonstrate and validate the technology for transition to end users for follow on implementation.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army											Date: May 2021					
Appropriation/Budget Activity 2040 / 4				R-1 Program Element (Number/Name) PE 0603779A / Environmental Quality Technology - Dem/Val				Project (Number/Name) E21 / Environmental Quality Technology Dem/Val								
Test and Evaluation (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total				
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract	
Conduct Demonstrations	MIPR	Varies : Varies	36.797	12.744	Oct 2019	12.820	Oct 2020	6.608	Oct 2021	-		6.608	Continuing	Continuing	Continuing	
<b>Subtotal</b>			36.797	12.744		12.820		6.608		-		6.608	Continuing	Continuing	N/A	
<b>Project Cost Totals</b>			36.797	12.744		12.820		6.608		-		6.608	Continuing	Continuing	N/A	
<b>Remarks</b>																

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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2022 Army</b>			<b>Date: May 2021</b>		
<b>Appropriation/Budget Activity</b> 2040 / 4		<b>R-1 Program Element (Number/Name)</b> PE 0603779A / <i>Environmental Quality Technology - Dem/Val</i>		<b>Project (Number/Name)</b> E21 / <i>Environmental Quality Technology Dem/Val</i>	

Event Name	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Toxic Metals Reduction Demonstration/Validation	█				█				█				█															
Airborne Lead Reduction Demonstration/Validation	█				█				█				█				█				█							
Insensitive Munitions (IM) Wastewater Treatment	█				█				█				█															
Fate and Risk Evaluation System for Contaminants	█				█				█				█															
Environmental Toolkit for Expeditionary Operations	█				█				█				█															
Low Global Warming Potential Dem/Val	█				█				█				█				█				█							

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603779A / <i>Environmental Quality Technology - Dem/Val</i>	<b>Project (Number/Name)</b> E21 / <i>Environmental Quality Technology Dem/Val</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Toxic Metals Reduction Demonstration/Validation	1	2015	4	2023
Airborne Lead Reduction Demonstration/Validation	1	2015	4	2025
ESOH Impacts of Short-Term Noise Assessment Procedures Demonstration/Validation	1	2016	4	2019
Advanced Water Reuse Technology for Fixed Installations	1	2016	4	2019
Insensitive Munitions (IM) Wastewater Treatment	1	2018	4	2022
Fate and Risk Evaluation System for Contaminants	1	2019	4	2021
Environmental Toolkit for Expeditionary Operations	1	2019	4	2022
Low Global Warming Potential Dem/Val	1	2019	4	2025

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2022 Army **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040: <i>Research, Development, Test &amp; Evaluation, Army / BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0603790A / NATO Research and Development
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	-	5.184	4.589	3.777	-	3.777	-	-	-	-	-	-
691: <i>NATO Rsch &amp; Devel</i>	-	5.184	4.589	3.777	-	3.777	-	-	-	-	-	-

**A. Mission Description and Budget Item Justification**

This Project implements the provisions of Title 10 United States (U.S.) Code, Section 2350a, Cooperative Research and Development (R&D) Projects: Allied Countries. The objective is to improve, through the application of emerging technologies, the conventional defense capabilities of the U.S. and our cooperative partners, including the North Atlantic Treaty Organization (NATO), U.S. major non-NATO allies and Friendly Foreign countries through technology sharing and joint equipment development, thereby reducing U.S. acquisition costs. Cooperative efforts also improve multinational force compatibility with potential coalition partners through the development and use of similar equipment and improved interfaces. The Project focuses specifically on international cooperative technology demonstration, validation, and interoperability of Army weapon and command, control, communications and information (C3I) systems, including the NATO Defense Against Terrorism initiatives. Activities are implemented through international agreements with foreign partners that define scope, cost and work sharing arrangements, management, contracting, security, data protection and third party transfers. Funds are used to pay for only the U.S. work share that occurs in the United States at U.S. Government and U.S. contractor facilities.

<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022 Base</b>	<b>FY 2022 OCO</b>	<b>FY 2022 Total</b>
Previous President's Budget	5.406	4.762	4.852	-	4.852
Current President's Budget	5.184	4.589	3.777	-	3.777
Total Adjustments	-0.222	-0.173	-1.075	-	-1.075
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.222	-0.173			
• Adjustments to Budget Years	-	-	-1.075	-	-1.075

**Change Summary Explanation**

1. Reduced \$1.0M ICR&D projects for R&D and PEO organizations on conducting armaments cooperation with foreign allies and partners in the Six Modernization Priority areas.
2. Economic adjustments for \$75K.

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army										<b>Date:</b> May 2021		
<b>Appropriation/Budget Activity</b> 2040 / 4					<b>R-1 Program Element (Number/Name)</b> PE 0603790A / NATO Research and Development				<b>Project (Number/Name)</b> 691 / NATO Rsch & Devel			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022 Base</b>	<b>FY 2022 OCO</b>	<b>FY 2022 Total</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>FY 2026</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
691: NATO Rsch & Devel	-	5.184	4.589	3.777	-	3.777	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

This Project implements the provisions of Title 10 United States (U.S.) Code, Section 2350a, Cooperative Research and Development (R&D) Projects: Allied Countries. The objective is to improve, through the application of emerging technologies, the conventional defense capabilities of the U.S. and our cooperative partners, including the North Atlantic Treaty Organization (NATO), U.S. major non-NATO allies and Friendly Foreign countries through technology sharing and joint equipment development, thereby reducing U.S. acquisition costs. Cooperative efforts also improve multinational force compatibility with potential coalition partners through the development and use of similar equipment and improved interfaces. The Project focuses specifically on international cooperative technology demonstration, validation, and interoperability of Army weapon and command, control, communications and information (C3I) systems, including the NATO Defense Against Terrorism initiatives. Activities are implemented through international agreements with foreign partners that define scope, cost and work sharing arrangements, management, contracting, security, data protection and third party transfers. Funds are used to pay for only the U.S. work share that occurs in the United States at U.S. Government and U.S. contractor facilities.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
<b>Title:</b> Armaments Cooperation Enterprise Support	3.876	3.436	2.624
<b>Description:</b> Armaments Cooperation Enterprise Support/ International Online (IOL) Development and Implementation NATO/ International Cooperative R&D (AR 70-41) and International Acquisition (AR 70-1, AR 70-3).  The goal of this activity is to expand worldwide allied standardization and interoperability through cooperative Research and Development (R&D) and technology sharing per SECDEF guidance and especially in support of the U.S. Army. The execution AR 70-41 responsibilities requires DASA (DE&C) to conduct engagement with key strategy foreign partners in all regions of the world through the SNR(A) program, international agreement negotiations, and other bilateral and multilateral forums involving DASA (DE&C) personnel. This program will fund the travel costs and administrative support (studies, analysis, interpretation, equipment, etc.) required to participate internationally, such as the NATO Army Armaments Group (NAAG), Defense Against Terrorism (DAT) and to pursue new cooperative R&D initiatives and international cooperative agreements such as memoranda of understanding.  <b>FY 2021 Plans:</b> Funds will allow the coordination for cooperative research, development and evaluation of defense technologies / systems / equipment plus joint production and follow-on support of defense systems or equipment and the procurement of foreign technologies.  <b>FY 2022 Plans:</b>			

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army		<b>Date:</b> May 2021		
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603790A / NATO Research and Development	<b>Project (Number/Name)</b> 691 / NATO Rsch & Devel		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
<p>Promotes more equitable sharing of International Cooperative conventional R&amp;D costs through cooperative projects. Provides funds to conduct cooperative R&amp;D projects, under international cooperative research, development and acquisition (ICRDA) agreements (MOU or Project Agreement/Arrangement [PA]), on defense equipment and munitions with NATO, NATO organizations, major non-NATO allies, and other friendly foreign countries with senior representatives. Supports 9 CMEs with Armaments Cooperation Support with munitions, weapons, aviation and armaments.</p> <p><b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> Economic Adjustment.</p>				
<p><b>Title:</b> Communications Interoperability, and Electronics Technologies</p> <p><b>Description:</b> The goal of this activity is to develop technologies that enable interoperability among partner countries' command, control, communications, sensors, and information systems. Efforts include development of a single solution standard avoiding development of multiple unique solutions and leverage existing interoperability standards developed by NATO. Such standards include common doctrine, technical and procedural specifications to make better use of existing information, shared data, leveraged national operating picture capabilities and enable the development of interoperability of data, databases, applications, security domains and national networks architectures. Includes efforts from areas formerly titled Multi-National Network Enabled Capabilities, Low Level Air Defense Interoperability, JTRS, Combat Identification, and Multilateral Interoperability Program.</p> <p><b>FY 2021 Plans:</b> FY 2021 funding include efforts from areas formerly titled Multi-National Network Enabled Capabilities, Low Level Air Defense Interoperability, JTRS, Combat Identification, and Multilateral Interoperability Program.</p> <p><b>FY 2022 Plans:</b> Include efforts from areas formerly titled Multi-National Network Enabled Capabilities, Low Level Air Defense Interoperability, JTRS, Combat Identification, and Multilateral Interoperability Program.</p>		0.302	0.266	0.266
<p><b>Title:</b> Senior National Representatives (Army) (SNR-(A))</p> <p><b>Description:</b> Senior National Representatives (Army) (SNR-(A)) Projects (Partners: France, Germany, United Kingdom and Italy): Supports harmonization of programs at various levels: exchanging information, identifying knowledge gaps and conducting feasibility studies to further promote cooperative development; standardizing, fielding and road-mapping various processes; distributing the workload among the different nations. Technology Demonstrations hosted by the U.S. reps to Land Group 6, NATO Army Armaments Group (NAAG), will provide an opportunity to observe and demonstrate the current and future capability of participating NATO nations with a view to assisting future operational and materiel interoperability. Army support of NAAG studies, analysis and technology demonstrations.</p> <p><b>FY 2021 Plans:</b></p>		0.031	0.028	0.028

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army		<b>Date:</b> May 2021		
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603790A / NATO Research and Development	<b>Project (Number/Name)</b> 691 / NATO Rsch & Devel		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
<p>Funds will be used to pursue cooperative initiatives that were postponed, cancelled or not pursued due to funding reductions in previous years such as forums and engagement with long-standing foreign partners to identify interoperability gaps and develop necessary standardization programs.</p> <p><b>FY 2022 Plans:</b> Funds will be used to pursue cooperative initiatives that were postponed, cancelled or not pursued due to funding reductions in previous years such as forums and engagement with long-standing foreign partners to identify interoperability gaps and develop necessary standardization programs.</p>				
<p><b>Title:</b> Weapons and Munitions Technologies</p> <p><b>Description:</b> The goal of this activity is to cooperate with partner countries to increase interoperability and develop jointly technologies to improve range, payloads, speed, survivability and lethality to maintain U.S. technical superiority and combat overmatch for Army weapons systems and associated munitions. Areas of cooperation include fuzing and warhead systems, guidance systems, counter improvised explosive device neutralization, directed energy, and fire control systems. Such cooperative development will be done under the auspices of international agreements established among the participating countries for the purposes of improving defense capabilities of the U.S. and partner countries.</p> <p><b>FY 2021 Plans:</b> Weapons and munitions technologies (Partners: France, Germany, Italy, UK): The Participants in this program will develop an automated software interface between their national field artillery command and control systems. The nations will be able to receive and provide mutual fire support (i.e. cannon and rocket fire) in combined operations more rapidly and with minimal errors.</p> <p><b>FY 2022 Plans:</b> Weapons and munitions technologies (Partners: France, Germany, Italy, UK): The Participants in this program will develop an automated software interface between their national field artillery command and control systems. The nations will be able to receive and provide mutual fire support (i.e. cannon and rocket fire) in combined operations more rapidly and with minimal errors.</p>		0.243	0.214	0.214
<p><b>Title:</b> Ground Systems Technologies</p> <p><b>Description:</b> The goal of this activity is to cooperate with partner countries to increase interoperability and develop jointly technologies to improve survivability, weapons, ground platforms (manned and unmanned), and mobility and counter-mobility to provide soldiers with unmatched offensive and defensive capabilities in weapons and military vehicles. Areas of cooperation include ground systems design, propulsion, structures, robotics, alternative fuels and lubricants, systems integration, electronics, and power management. Such cooperative development will be done under the auspices of international agreements established among the participating countries for the purposes of improving defense capabilities of the U.S. and partner countries.</p> <p><b>FY 2021 Plans:</b></p>		0.243	0.214	0.214



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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army		<b>Date:</b> May 2021		
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603790A / NATO Research and Development	<b>Project (Number/Name)</b> 691 / NATO Rsch & Devel		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
<p>FY 2021 funding will be used to fund the continuation of cooperative projects in armored vehicle underbody blast protection and unmanned ground vehicles such as Hybrid Electric Project Agreement between US and Japan.</p> <p><b>FY 2022 Plans:</b> FY 2022 funding will be used to fund the continuation of cooperative projects in armored vehicle underbody blast protection and unmanned ground vehicles such as Hybrid Electric Project Agreement between US and Japan.</p>				
<p><b>Title:</b> Aviation Systems Technologies</p> <p><b>Description:</b> The goal of this activity is to cooperate with partner countries to increase interoperability and develop jointly improved aerodynamics, aeromechanics, avionics, weapons and sensor integration, propulsion, and aviation autonomy technologies that improve range, payloads, speed, survivability and lethality to maintain U.S. technical superiority and combat overmatch for vertical lift aviation systems. Such cooperative development will be done under the auspices of international agreements established among the participating countries for the purposes of improving defense capabilities of the U.S. and partner countries.</p> <p><b>FY 2021 Plans:</b> FY 2021 funding will be used to pursue cooperative projects (i.e., the development of advance rotorcraft technologies and improve systems that aid pilots and aircrew in degraded visual environments).</p> <p><b>FY 2022 Plans:</b> FY 2022 funding will be used to pursue cooperative projects (i.e., the development of advance rotorcraft technologies and improve systems that aid pilots and aircrew in degraded visual environments).</p>		0.489	0.431	0.431
<b>Accomplishments/Planned Programs Subtotals</b>		5.184	4.589	3.777
<b>C. Other Program Funding Summary (\$ in Millions)</b>				
N/A				
<b>Remarks</b>				
<b>D. Acquisition Strategy</b>				
<p>Acquisition Strategy: The goal of this program is to expand worldwide allied standardization interoperability through cooperative research and development (R&amp;D) and technology sharing per SECDEF guidance and especially in support of the of the U.S. Army. All projects are test or technical demonstrations to feed into potential new requirements in support of Army Transformation to the Future Force or as product improvements to the Current Force.</p>				

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603790A / NATO Research and Development	<b>Project (Number/Name)</b> 691 / NATO Rsch & Devel
<p>List of the programs curenly in place:</p> <p><b>Communications, Interoperability, and Electronics Technologies</b>          The goal of this project is to develop technologies that enable interoperability among partner countries' command, control, communications, sensors, and information systems. Efforts under this project include development of a single solution standard avoiding development of multiple unique solutions and leverage existing interoperability standards developed by NATO. Such standards include common doctrine, technical and procedural specifications to make better use of existing information, shared data, leverage national operating picture capabilities and enable the development of interoperability of data, databases, applications, security domains and national networks architectures. Includes projects formerly titled Multi-National Network Enabled Capabilities, Low Level Air Defense Interoperability, JTRS, Combat Identification, and Multilateral Interoperability Program.</p> <p><b>Aviation Systems Technologies</b>          The goal of this project is to cooperate with partner countries to increase interoperability and develop jointly improved aerodynamics, aeromechanics, avionics, weapons and sensor integration, propulsion, and aviation autonomy technologies that improve range, payloads, speed, survivability and lethality to maintain U.S. technical superiority and combat overmatch for vertical lift aviation systems. Such cooperative development will be done under the auspices of international agreements established among the participating countries for the purposes of improving defense capabilities of the U.S. and partner countries.</p> <p><b>Ground Systems Technologies</b>          The goal of this project is to cooperate with partner countries to increase interoperability and develop jointly technologies to improve survivability, weapons, ground platforms (manned and unmanned), and mobility and counter-mobility to provide soldiers with unmatched offensive and defensive capabilities in weapons and military vehicles. Areas of cooperation include ground systems design, propulsion, structures, robotics, alternative fuels and lubricants, systems integration, electronics, and power management. Such cooperative development will be done under the auspices of international agreements established among the participating countries for the purposes of improving defense capabilities of the U.S. and partner countries.</p> <p><b>Weapons and Munitions Technologies</b>          The goal of this project is to cooperate with partner countries to increase interoperability and develop jointly technologies to improve range, payloads, speed, survivability and lethality to maintain U.S. technical superiority and combat overmatch for Army weapons systems and associated munitions. Areas of cooperation include fuzing and warhead systems, guidance systems, counter improvised explosive device neutralization, directed energy, and fire control systems. Such cooperative development will be done under the auspices of international agreements established among the participating countries for the purposes of improving defense capabilities of the U.S. and partner countries.</p> <p><b>Armaments Cooperation Enterprise Support</b>          The goal of this program is to expand worldwide allied standardization and interoperability through cooperative research and development (R&amp;D) and technology sharing per SECDEF guidance and especially in support of the U.S. Army. This program will fund the travel costs and administrative support (studies, analysis, interpretation, equipment, etc.) required to participate internationally, such as the North Atlantic Treaty Organization (NATO) Army Armaments Group (NAAG), Defense Against Terrorism (DAT) and to pursue new cooperative R&amp;D initiatives and international cooperative agreements such as memoranda of understanding. This program will also include: the United States' share of costs of the NATO Civil Budget, Chapter IX, which funds the NATO Industrial Advisory Group (NIAG) and the Special Fund for</p>		

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**Exhibit R-2A, RDT&E Project Justification:** PB 2022 Army **Date:** May 2021

<b>Appropriation/Budget Activity</b>	<b>R-1 Program Element (Number/Name)</b>	<b>Project (Number/Name)</b>
2040 / 4	PE 0603790A / NATO Research and Development	691 / NATO Rsch & Development

Cooperative Planning (U. S. Army is Executive Agent for this NATO bill); the Technical Cooperation Program, and Army armaments cooperation working groups with many nations.

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army** **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603790A / NATO Research and Development	<b>Project (Number/Name)</b> 691 / NATO Rsch & Development
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<b>Management Services (\$ in Millions)</b>				<b>FY 2020</b>		<b>FY 2021</b>		<b>FY 2022 Base</b>		<b>FY 2022 OCO</b>		<b>FY 2022 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>			
Armaments Cooperation Enterprise Support	MIPR	DASA DEC HQDA : Ft Belvoir, VA	0.010	-		-		-		-		-	0.000	0.010	-
Weapons and Munitions	TBD	CECOM : Aberdeen Proving Ground, MD	0.008	-		-		-		-		-	0.000	0.008	-
Communications Interoperability and Electronic Technologies Interoperability	MIPR	SPAWAR : Various	0.010	-		-		-		-		-	0.000	0.010	-
Ground Systems Technologies	MIPR	TARDEC : Warren, MI	0.010	-		-		-		-		-	0.000	0.010	-
Chemical and Biological Technologies	MIPR	Aberdeen Proving Ground : MD	0.010	-		-		-		-		-	0.000	0.010	-
<b>Subtotal</b>			0.048	-		-		-		-		-	0.000	0.048	N/A

<b>Product Development (\$ in Millions)</b>				<b>FY 2020</b>		<b>FY 2021</b>		<b>FY 2022 Base</b>		<b>FY 2022 OCO</b>		<b>FY 2022 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>			
Missiles and Rocket Technologies	MIPR	APG, Redstone Arsenal : MD, AL	0.100	-		-		-		-		-	0.000	0.100	-
Communications, Interoperability, and Electronics Technologies	MIPR	CECOM, JTRS, COALWNW, JTNC, SPAWAR : San Diego, CA, various	0.529	-		-		-		-		-	0.000	0.529	-
Weapons and Munitions	Various	ARDEC, PEO AMMO, PM-CAS : VARIOUS	0.752	-		-		-		-		-	0.000	0.752	-
Aviation Systems Technologies	Various	AMRDEC : RED STONE, VARIOUS	0.175	-		-		-		-		-	0.000	0.175	-
Ground Systems Technology	FFRDC	Various : Various	0.125	-		-		-		-		-	0.000	0.125	-

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army												Date: May 2021			
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)							
2040 / 4				PE 0603790A / NATO Research and Development				691 / NATO Rsch & Development							
Product Development (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
SNR(A)	C/TBD	ARDEC: Arlington, VA : Various	9.012	-		-		-		-		-	Continuing	Continuing	Continuing
FY 2019 SBIR / STTR Transfer	TBD	TBD : TBD	0.118	-		-		-		-		-	0.000	0.118	-
<b>Subtotal</b>			10.811	-		-		-		-		-	Continuing	Continuing	N/A
Support (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Armaments Cooperation Enterprise Support	C/FFP	LSS/GDIT : Fairfax, VA	8.385	2.648		2.357		2.624		-		2.624	Continuing	Continuing	Continuing
Missiles and Rocket Technologies	MIPR	APG, Redstone Arsenal : MD, AL	0.700	0.895		0.785		-		-		-	0.000	2.380	-
Communications, Interoperability, and Electronics Technologies	MIPR	Joint Tactical Radio (JTRS), JTNC, COALWNW, SPAWAR, CERDEC, ARDEC W1DF : San Diego, CA, Red Stone Arsenal	1.259	0.448		0.395		0.266		-		0.266	Continuing	Continuing	Continuing
Aviation Systems Technologies	MIPR	RDECOM/ AMRDEC : Red Stone Arsenal	1.110	0.448		0.395		0.431		-		0.431	Continuing	Continuing	Continuing
Ground Systems Technology	MIPR	TARDEC : Various	0.478	-		-		0.214		-		0.214	Continuing	Continuing	Continuing
Weapons and Munitions	Various	CECOM, ARDEC, AMMO, PEO C3T : Aberdeen Proving Ground, Various	1.539	0.745		0.657		0.214		-		0.214	Continuing	Continuing	Continuing
Soldier Technologies	TBD	Various : Various	0.346	-		-		-		-		-	0.000	0.346	-

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army												Date: May 2021			
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)							
2040 / 4				PE 0603790A / NATO Research and Development				691 / NATO Rsch & Development							
<b>Support (\$ in Millions)</b>				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
SNR(A)	C/TBD	ARL, HQDA, JCGISR: Army : Various	2.318	-		-		0.028		-		0.028	Continuing	Continuing	Continuing
Chemical & Biological Defense Technologies	MIPR	ECBC : Edgewood, Aberdeen, MD	0.270	-		-		-		-		-	0.000	0.270	-
<b>Subtotal</b>			16.405	5.184		4.589		3.777		-		3.777	Continuing	Continuing	N/A
<b>Test and Evaluation (\$ in Millions)</b>				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Communications, Interoperability, and Electronics Technologies	Various	JTRN, JTNC, COALWNW, CERDEC, NIGHT VISION : SPAWAR	0.444	-		-		-		-		-	0.000	0.444	-
Weapons and Munitions	TBD	ARDEC, PEO AMMO, ASCA : Various	0.200	-		-		-		-		-	0.000	0.200	-
Aviation Systems Technologies	TBD	RDECOM, AMRDEC : RED STONE	0.080	-		-		-		-		-	0.000	0.080	-
Ground Systems Technologies	MIPR	TARDEC : Various	0.050	-		-		-		-		-	0.000	0.050	-
<b>Subtotal</b>			0.774	-		-		-		-		-	0.000	0.774	N/A
<b>Project Cost Totals</b>			28.038	5.184		4.589		3.777		-		3.777	Continuing	Continuing	N/A
<b>Remarks</b>															

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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2022 Army</b>							<b>Date: May 2021</b>				
<b>Appropriation/Budget Activity</b> 2040 / 4				<b>R-1 Program Element (Number/Name)</b> PE 0603790A / NATO Research and Development				<b>Project (Number/Name)</b> 691 / NATO Rsch & Development			

	FY 2013				FY 2014				FY 2015				FY 2016				FY 2017				FY 2018				FY 2019			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
N/A	[REDACTED]																											

	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
N/A																												

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603790A / NATO Research and Development	<b>Project (Number/Name)</b> 691 / NATO Rsch & Devel

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
N/A	1	2017	4	2017



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**Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Army** **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040: <i>Research, Development, Test &amp; Evaluation, Army / BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0603801A / <i>Aviation - Adv Dev</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	-	488.397	694.296	1,125.641	-	1,125.641	-	-	-	-	-	-
B47: <i>Future Vertical Lift</i>	-	111.274	213.538	448.412	-	448.412	-	-	-	-	-	-
CK7: <i>FARA Ecosystem</i>	-	-	-	26.986	-	26.986	-	-	-	-	-	-
F12: <i>Future Attack Reconnaissance Aircraft</i>	-	377.123	480.758	650.243	-	650.243	-	-	-	-	-	-

**A. Mission Description and Budget Item Justification**

Future Vertical Lift (FVL) is an initiative to develop a family of vertical lift aircraft for the United States Armed Forces. The Department of Defense (DOD) established FVL to focus vertical lift capabilities and technology development as well as retain long-term industrial base capabilities. The Deputy Secretary of Defense issued the FVL Strategic Plan in 2012 to outline a joint approach for the next generation vertical lift aircraft for all military services. The Strategic Plan provided a foundation for replacing the current fleet with advanced capability by shaping the development of vertical lift aircraft for the next 25 to 40 years. In Fiscal Year (FY) 2017, the Army identified FVL as one of the Army's six modernization priorities, and established the FVL Cross Functional Team. The FVL objectives are increased vertical lift maneuverability, range, speed, payload, survivability, and reliability while reducing the logistical footprint. This capability will provide critical vertical lift aviation capability in multi-domain operations to the joint warfighter and maneuver force.

The Future Long Range Assault Aircraft (FLRAA) program pursues FVL Capability Set 3 (CS3) and provides Combatant Commanders with deterrence, power projection, and tactical capabilities at operational and strategic distances. The Army plans to competitively award the weapon system development Program of Record (PoR) contract in FY 2022, using a hybrid acquisition approach. The FY 2022 contract award initiates Rapid Prototyping effort to execute a preliminary design and development of FLRAA Virtual Prototype, using Middle Tier Acquisition (MTA) authorities.

The Future Attack Reconnaissance Aircraft (FARA) Capability Set 1 (CS1) is the Army's number one Aviation modernization priority and will restore attack/reconnaissance dominance by mitigating enemy long range capabilities by creating lethal effects from outside enemy sensor/weapons range and allowing joint force commanders to maneuver from relative sanctuary.

Both FLRAA and FARA variants will integrate advanced technologies and design configurations with appropriate trades to ensure affordability.

This resourcing funds both FLRAA and FARA.

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**Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Army** **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040: <i>Research, Development, Test &amp; Evaluation, Army / BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0603801A / <i>Aviation - Adv Dev</i>
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<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022 Base</b>	<b>FY 2022 OCO</b>	<b>FY 2022 Total</b>
Previous President's Budget	505.890	647.937	789.356	-	789.356
Current President's Budget	488.397	694.296	1,125.641	-	1,125.641
Total Adjustments	-17.493	46.359	336.285	-	336.285
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-25.491			
• Congressional Rescissions	-	-			
• Congressional Adds	-	95.500			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-17.493	-23.650			
• Adjustments to Budget Years	-	-	336.285	-	336.285

**Congressional Add Details (\$ in Millions, and Includes General Reductions)**

**Project:** B47: *Future Vertical Lift*

Congressional Add: *Competitive Demonstration Risk Reduction*

Congressional Add: *University Partnership and Model Based System Engineering*

Congressional Add Subtotals for Project: B47

Congressional Add Totals for all Projects

	<b>FY 2020</b>	<b>FY 2021</b>
	75.600	90.500
	5.000	5.000
Congressional Add Subtotals for Project: B47	80.600	95.500
Congressional Add Totals for all Projects	80.600	95.500

**Change Summary Explanation**

Project B47: FLRAA FY 2022 budget increased by \$267.557M to support an extended Competitive Demonstration and Risk Reduction Phase II effort by continuing competition, accelerating preliminary design, and setting the conditions to award the Program of Record contract.

Project F12: FARA FY 2022 budget increased by \$41.646M to support FARA Increment #1 air vehicle design and mission systems integration risk reduction efforts.

Project CK7: FY 2022 budget increased by \$27.082M to support FARA Ecosystem Prototyping Demonstration efforts.

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army										<b>Date:</b> May 2021		
<b>Appropriation/Budget Activity</b> 2040 / 4					<b>R-1 Program Element (Number/Name)</b> PE 0603801A / Aviation - Adv Dev				<b>Project (Number/Name)</b> B47 / Future Vertical Lift			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022 Base</b>	<b>FY 2022 OCO</b>	<b>FY 2022 Total</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>FY 2026</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
B47: Future Vertical Lift	-	111.274	213.538	448.412	-	448.412	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

The Future Vertical Lift (FVL) Project's funding provides for the development of a Future Long Range Assault Aircraft (FLRAA) Capability Set Three weapon system within the FVL family of systems. FLRAA will conduct air assault, urban assault/security, maritime interdiction, medical evacuation, humanitarian assistance/disaster relief, tactical resupply, direct action, noncombatant evacuation operation, and combat search and rescue operations. FLRAA will support the Army, including Special Operations Command (USSOCOM) and the Joint Force, in a contested, near peer threat environment. The FLRAA weapon system will retain the Army's ability to project combat power with significantly increased range, speed, mobility, and payload over current Army and USSOCOM aircraft.

FLRAA achieved a Materiel Development Decision approval in October 2016 and the Office of Secretary of Defense granted a sufficiency determination of the Analysis of Alternatives (AoA) in July 2019. FY 2020 funding supported continuation of the FVL Architecture Risk Reduction effort in support of Modular Open Systems Approach (MOSA); life cycle affordability efforts; planning, proposal evaluations and award of the Competitive Demonstration and Risk Reduction (CD&RR) Phase I effort; University Partnership; and supported key program documents to include the Abbreviated Capabilities Development Document, the Program Acquisition Strategy, the draft Weapon System Specification, the Systems Engineering Plan, the Life Cycle Sustainment Plan (LCSP) and the Contract Requirements Package (CRP).

FY 2021 funding supports the completion of CD&RR Phase I effort with two project agreement holders culminating with an initial conceptual design and requirements decomposition activities. FY 2021 funding also supports the award of CD&RR Phase II; continued execution of MOSA efforts; efforts to refine affordability; continued development of the CRP; release of the RFP; initiation of the Source Selection Evaluation Board (SSEB); and key events leading to contract award.

FY 2022 funding will support completion of CD&RR Phase II effort culminating with an Initial Design Concept Review (IDCR) equivalent to a preliminary design review; continued MOSA efforts; completion of the SSEB; and key events leading up to the initiation and execution of an approved Army Acquisition Strategy and October 2020 Acquisition Decision Memorandum. The Army will award a contract in FY 2022 for the execution of to complete a weapon system preliminary design review, initiate prototype material acquisition and a Middle Tier Acquisition (MTA) effort to deliver a virtual prototype no later than FY 2024.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
<b>Title:</b> Engineering Services / Research Studies	21.327	109.941	296.771
<b>Description:</b> Provide engineering research, planning, modeling, and analysis. Perform model based system engineering and design reviews. Document and review analysis supporting the FLRAA acquisition program. Continue Competitive Demonstration Risk Reduction efforts.			
<b>FY 2021 Plans:</b>			

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army		<b>Date:</b> May 2021		
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603801A / Aviation - Adv Dev	<b>Project (Number/Name)</b> B47 / Future Vertical Lift		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
<p>Continue execution of Competitive Demonstration Risk Reduction and MOSA efforts, support SSEB, and support key events leading to contract award.</p> <p><b>FY 2022 Plans:</b> Continue MOSA efforts, complete CD&amp;RR Phase II effort; support the SSEB, and award the Weapon Systems Development contract.</p> <p><b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> Increase to the CD&amp;RR effort to extend and include preliminary design efforts, and staff to support efforts leading to Weapon System Development contract award.</p>				
<p><b>Title:</b> Program Management</p> <p><b>Description:</b> Oversight and Management of the FLRAA acquisition program.</p> <p><b>FY 2021 Plans:</b> Continue to complete efforts to refine affordability, execute Competitive Demonstration Risk Reduction, release Request for Proposal, and execute SSEB.</p> <p><b>FY 2022 Plans:</b> Continue efforts to refine affordability, execute CD&amp;RR Phase II effort, execute and complete SSEB, and award the Weapon Systems Development contract.</p> <p><b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> Increase to the CD&amp;RR effort and staff to support efforts leading to contract award.</p>		5.549	4.780	16.283
<p><b>Title:</b> Supportability Analysis and Acquisition Support</p> <p><b>Description:</b> Acquisition and supportability research, planning, modeling, analysis, documentation and reviews supporting the FLRAA acquisition program. Early design influence analysis to assess operational durability; emphasizing digital data thread, active health state awareness (CBM+), and optimized human system interface for ease of operations and maintenance.</p> <p><b>FY 2021 Plans:</b> Continue to support the developing of the CRP and the initiation of the SSEB. Extensive implementation of reliability centered maintenance and product support analysis planning using robust modeling and simulation such as a system of system analysis tool, focused on delivering sustained System Readiness metrics in support of optimizing Life Cycle Costs.</p> <p><b>FY 2022 Plans:</b></p>		3.798	3.317	3.511

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army	<b>Date:</b> May 2021
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<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603801A / Aviation - Adv Dev	<b>Project (Number/Name)</b> B47 / Future Vertical Lift
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<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	FY 2020	FY 2021	FY 2022
Integrate supportability within Systems Engineering design process and the modeling/simulations to influence requirements. Continue to expand the robustness of government baseline models; merging with both Model Base System Engineering (MBSE) and the POE/IGSE , and comparative evaluation of system design and support alternatives.  <b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> Increase is due to expanded MBSE support.			
<b>Title:</b> Middle Tier Acquisition (MTA) Preliminary Design and Virtual Prototype Rapid Prototyping  <b>Description:</b> The Preliminary Design and MTA Virtual Prototype Rapid Prototyping effort is executed under the Weapon System Development Base contract scoped to complete the system preliminary design and develop a virtual prototype.  <b>FY 2022 Plans:</b> Initiate the preliminary design and virtual prototype efforts of the Weapon Systems Development contract.  <b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> Program begins execution with a MTA Virtual Prototyping and Weapon System Development Contract award in FY 2022.	-	-	102.648
<b>Title:</b> Prototype Material and Manufacturing Development  <b>Description:</b> The Weapon System Development includes procurement of long lead material and initiation of engineering manufacturing development.  <b>FY 2022 Plans:</b> Initiate material buy  <b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> Begin material buy	-	-	29.199
<b>Accomplishments/Planned Programs Subtotals</b>	30.674	118.038	448.412

	FY 2020	FY 2021
<b>Congressional Add:</b> Competitive Demonstration Risk Reduction  <b>FY 2020 Accomplishments:</b> Supported execution of Competitive Demonstration Risk Reduction and MOSA efforts.  <b>FY 2021 Plans:</b> Support execution of Competitive Demonstration Risk Reduction and MOSA efforts.	75.600	90.500
<b>Congressional Add:</b> University Partnership and Model Based System Engineering	5.000	5.000

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army	<b>Date:</b> May 2021
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<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603801A / Aviation - Adv Dev	<b>Project (Number/Name)</b> B47 / Future Vertical Lift
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	FY 2020	FY 2021
<b>FY 2020 Accomplishments:</b> University Partnership and Model Based System Engineering		
<b>FY 2021 Plans:</b> Support Model Based System Engineering		
<b>Congressional Adds Subtotals</b>	80.600	95.500

**C. Other Program Funding Summary (\$ in Millions)**

N/A

**Remarks**

Program Element 0603465A Future Vertical Lift Advanced Technology includes JMR-TD; supported flying demonstrator activities providing knowledge transfer from flight test, data analysis, Soldier touch points, and risk reduction activities to the FLRAA program.

**D. Acquisition Strategy**

The Army is executing a hybrid acquisition approach to design, develop, and deliver the FLRAA weapons system. In order to support the Army's modernization strategy and concept for multi-domain operations, the FLRAA program will deliver a first unit equipped in FY 2030. This hybrid approach builds on the Joint Multi-Role Technology Demonstration (JMR-TD) efforts (ongoing since 2013); the Army's AoA (completed in July 2019); and multiple ongoing risk mitigation efforts.

The Army's risk mitigation activities ahead of the Program of Record (PoR) include: (1) additional conceptual design and flight envelope expansion tasks on the existing JMR-TD Technology Investment Agreements; (2) a modular open systems approach (MOSA), FVL Architecture Collaboration Working Group (with participation from industry and academia) to establish a common architecture requirements framework for FLRAA and FARA system development; and (3) a Competitive Demonstration and Risk Reduction (CD&RR) effort, awarded to two Project Agreement Holders, using an Aviation Missile and Technology Consortium (AMTC) Other Transaction Authority (OTA) agreements to provide substantiating technical documentation on weapon system designs, requirements decompositions, trade-studies, and requirements feasibility for the FLRAA PoR.

These risk reduction activities maintain industry engagement and momentum from the JMR-TD S&T program, inform capabilities and system requirements, and provide initial trade assessments for the final operational requirements. They also inform the final acquisition strategy, mature the Government's architecture requirements development, and transition appropriate S&T data and technologies to the PoR. CD&RR Phase II incorporates efforts leading to preliminary design using a digital engineering environment. In FY 2022, the Army plans to competitively award the Weapon System Development PoR contract to one vendor with a hybrid acquisition approach. This approach includes the opportunity to employ new DoDI 5000.80 (Operation of the Middle Tier Acquisition (MTA)) authorities along with a tailored DoDI 5000.85 (Major Capability Acquisition) acquisition strategy.

Finally, the Army is also addressing life cycle affordability, sustainability, and maintainability early in the program. The FLRAA program is employing multiple strategies including: should cost reduction opportunities, use of a digital thread from design through sustainment, and stochastic sustainment modeling. Additionally, FLRAA is one of the Army's pilot programs for life cycle intellectual property and data strategy development.

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army** **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603801A / Aviation - Adv Dev	<b>Project (Number/Name)</b> B47 / Future Vertical Lift
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<b>Management Services (\$ in Millions)</b>				<b>FY 2020</b>		<b>FY 2021</b>		<b>FY 2022 Base</b>		<b>FY 2022 OCO</b>		<b>FY 2022 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>			
Program Management	Various	various : Redstone Arsenal, AL	3.060	5.549	Dec 2019	4.780	Dec 2020	16.283	Dec 2021	-		16.283	Continuing	Continuing	Continuing
<b>Subtotal</b>			3.060	5.549		4.780		16.283		-		16.283	Continuing	Continuing	N/A

<b>Product Development (\$ in Millions)</b>				<b>FY 2020</b>		<b>FY 2021</b>		<b>FY 2022 Base</b>		<b>FY 2022 OCO</b>		<b>FY 2022 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>			
Preliminary Design and Virtual Prototype Rapid Prototyping	C/TBD	TBD : TBD	-	-		-		102.648	Jun 2022	-		102.648	Continuing	Continuing	-
Prototype Material and Manufacturing Development	C/TBD	Various : Various	-	-		-		29.199	Jun 2022	-		29.199	0.000	29.199	-
<b>Subtotal</b>			-	-		-		131.847		-		131.847	Continuing	Continuing	N/A

<b>Support (\$ in Millions)</b>				<b>FY 2020</b>		<b>FY 2021</b>		<b>FY 2022 Base</b>		<b>FY 2022 OCO</b>		<b>FY 2022 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>			
Acquisition and Supportability Analysis	C/Various	Army Materiel Command / Army Contracting Command/Army Future Command : Redstone Arsenal, AL	2.468	3.798	Nov 2019	3.317	Nov 2020	3.511	Nov 2021	-		3.511	Continuing	Continuing	Continuing
University Partnership / Model Based System Engineering (MBSE)	C/Various	Various : Various	-	5.000	Mar 2020	5.000	Mar 2021	-		-		-	0.000	10.000	-
Engineering Services/ Competitive Demonstration Risk Reduction - Other	C/CS	Advanced Technology International; Sikorsky Aircraft Corp;	-	75.600	Mar 2020	170.486	Mar 2021	262.279	Nov 2021	-		262.279	0.000	508.365	-

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army	Date: May 2021
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<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603801A / Aviation - Adv Dev	<b>Project (Number/Name)</b> B47 / Future Vertical Lift
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<b>Support (\$ in Millions)</b>				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
		Bell Textron Inc : Summerville, SC; Stratford, CT; Fort Worth, TX													
Engineering Services / Research Studies - Other	Various	Various : Huntsville, AL	0.512	-		27.687	Mar 2021	8.074	Nov 2021	-		8.074	Continuing	Continuing	Continuing
Engineering Services / Research Studies - Organic	MIPR	VARIOUS : VARIOUS	0.039	10.336	Feb 2020	2.268	Feb 2021	5.910	Mar 2022	-		5.910	Continuing	Continuing	Continuing
Engineering Services / Research Studies - Other	C/Various	Various : Various	2.917	10.991	Mar 2020	-		2.346	Dec 2021	-		2.346	Continuing	Continuing	Continuing
FY 2020 SBIR/STTR Transfer	TBD	Various : Various	-	-		-		18.162		-		18.162	Continuing	Continuing	-
<b>Subtotal</b>			5.936	105.725		208.758		300.282		-		300.282	Continuing	Continuing	N/A

	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
<b>Project Cost Totals</b>	8.996	111.274	213.538	448.412	-	448.412	Continuing	Continuing	N/A

Remarks



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**Exhibit R-4, RDT&E Schedule Profile: PB 2022 Army** **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603801A / Aviation - Adv Dev	<b>Project (Number/Name)</b> B47 / Future Vertical Lift
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Event Name	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
System Specification Development																												
Program Documentation and Contracts Requirements Package																												
Architecture Definition and Risk Reduction																												
Competitive Demonstration and Risk Reduction																												
Request for Proposal Release																												
Proposal Preparation																												
Source Selection Evaluation Board																												
Contract Award																												
Virtual Prototyping (MTA)																												
Preliminary Design (MTA) and Detail Design																												
Prototype Builds																												
Prototype Deliveries																												
Flight Testing																												

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**Exhibit R-4A, RDT&E Schedule Details:** PB 2022 Army **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603801A / Aviation - Adv Dev	<b>Project (Number/Name)</b> B47 / Future Vertical Lift
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Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Matériel Development Decision	1	2017	1	2017
Analysis of Alternatives	3	2017	4	2019
System Specification Development	2	2019	3	2021
Program Documentation and Contracts Requirements Package	2	2019	3	2021
Architecture Definition and Risk Reduction	3	2019	4	2026
Competitive Demonstration and Risk Reduction	2	2020	3	2022
Request for Proposal Release	3	2021	3	2021
Proposal Preparation	3	2021	4	2021
Source Selection Evaluation Board	4	2021	3	2022
Contract Award	3	2022	3	2022
Virtual Prototyping (MTA)	3	2022	1	2024
Preliminary Design (MTA) and Detail Design	3	2022	2	2024
Prototype Builds	3	2023	2	2026
Prototype Deliveries	3	2025	3	2026
Flight Testing	3	2025	4	2029

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**Exhibit R-2A, RDT&E Project Justification:** PB 2022 Army **Date:** May 2021

Appropriation/Budget Activity 2040 / 4					R-1 Program Element (Number/Name) PE 0603801A / Aviation - Adv Dev				Project (Number/Name) CK7 / FARA Ecosystem			
COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
CK7: FARA Ecosystem	-	-	-	26.986	-	26.986	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**Note**

This effort was previously funded under the Future Attack Reconnaissance Aircraft (FARA) Project F12 and has been restructured to a unique Project to better support the cross-cutting capabilities demonstrated within this Project and provide transparency in modernization efforts.

**A. Mission Description and Budget Item Justification**

The Future Vertical Lift (FVL) Project's funding builds upon prior demonstrations and provides for early opportunities to validate technologies and requirement concepts and to off-ramp, maintain, or accelerate investments, which enable modernization at the speed of relevance.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	FY 2020	FY 2021	FY 2022
<b>Title:</b> FARA Ecosystems	-	-	26.986
<b>Description:</b> Funding for FARA Ecosystem supports prototyping demonstration with relevant technologies in a Joint All Domain Operations environment, which will inform FVL requirements including FLRAA, MOSA, and Air Launched Effects (ALE) and enable timely decisions to accelerate developmental capabilities, develop new capabilities, or defer development based on actual demonstration outcomes and user feedback.			
<b>FY 2022 Plans:</b> Continues FARA Ecosystem prototyping demonstration activities, previously conducted under Project F12, through primary surrogate platforms with multiple technologies to enable early opportunity to validate technologies and requirement concepts and to off-ramp, maintain, or accelerate investments in areas of interoperability, mission equipment, architecture, automation, autonomy, and interfaces (A3I), kinetic and non-kinetic effects, and sensors. Demonstration activities will include early Soldier touch points which will enable early feedback to inform requirements and concepts.			
<b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> This effort was previously funded under the Future Attack Reconnaissance Aircraft (FARA) Project F12 and has been restructured to a unique Project to better support the cross-cutting capabilities demonstrated within this Project and provide transparency in modernization efforts.			
<b>Accomplishments/Planned Programs Subtotals</b>	-	-	26.986

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army	<b>Date:</b> May 2021
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<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603801A / Aviation - Adv Dev	<b>Project (Number/Name)</b> CK7 / FARA Ecosystem
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**C. Other Program Funding Summary (\$ in Millions)**

<u>Line Item</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022</u> <u>Base</u>	<u>FY 2022</u> <u>OCO</u>	<u>FY 2022</u> <u>Total</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>FY 2026</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• F12: <i>Future Attack</i> <i>Reconnaissance Aircraft</i>	377.123	480.758	650.243	-	650.243	-	-	-	-	-	-

**Remarks**

**D. Acquisition Strategy**

The FVL CFT will utilize a number of U.S. Army Combat Capability Development Centers, Other Government Agencies, Test Centers, Project Management Offices and their respective scope execution instruments to execute capability demonstrations to assess the viability of technology and inform the Ecosystems requirements and concepts.



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**Exhibit R-4, RDT&E Schedule Profile: PB 2022 Army** **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603801A / Aviation - Adv Dev	<b>Project (Number/Name)</b> CK7 / FARA Ecosystem
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Event Name	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
FARA Ecosystem Demonstration																												
FARA Ecosystem Demonstration																												

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**Exhibit R-4A, RDT&E Schedule Details:** PB 2022 Army **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603801A / Aviation - Adv Dev	<b>Project (Number/Name)</b> CK7 / FARA Ecosystem
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Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
FARA Ecosystem Demonstration	1	2022	4	2029

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**Exhibit R-2A, RDT&E Project Justification:** PB 2022 Army **Date:** May 2021

Appropriation/Budget Activity 2040 / 4					R-1 Program Element (Number/Name) PE 0603801A / Aviation - Adv Dev				Project (Number/Name) F12 / Future Attack Reconnaissance Aircraft			
COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
F12: Future Attack Reconnaissance Aircraft	-	377.123	480.758	650.243	-	650.243	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**Note**

This effort restructured funds under the FARA Ecosystem Project CK7 to better support the cross-cutting capabilities demonstrated & to provide transparency in modernization efforts.

**A. Mission Description and Budget Item Justification**

The Future Attack Reconnaissance Aircraft (FARA) Project's funding provides for the development of a Capability Set 1 aircraft system within the Future Vertical Lift (FVL) family of systems. FVL Capability Set 1 aircraft will conduct attack/reconnaissance missions in support of the Army's modernization objective of conducting Multi-Domain Operations (MDO). The FARA platform will fill the gap in capability for light weight attack/reconnaissance while significantly increasing speed, range, survivability, and lethality, providing Combatant Commanders with greatly increased tactical, operational and strategic capabilities.

The FVL Capability Set 1 Initial Capabilities Requirements Document (ICRD) was approved in July 2018 under the name Future Attack Reconnaissance Aircraft (FARA). Abbreviated Capability Development Document (A-CDD) was approved 9 Apr 2021. The Acquisition Approach and Determination & Findings for Other Transaction Authority for Prototyping agreements were approved on 1 February 2019 by the Acting Under Secretary of Defense (Acquisition and Sustainment) to execute a Competitive Prototyping effort.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	FY 2020	FY 2021	FY 2022
<b>Title:</b> Future Attack Reconnaissance Aircraft	377.123	480.758	650.243
<b>Description:</b> Design, build, and test Competitive Prototype (CP) aircraft in preparation to rapidly develop and field a Multi-Domain Operations capable attack/reconnaissance vertical lift aircraft.			
<b>FY 2021 Plans:</b> Funds completion of two industry Performers? CP aircraft design, begins hardware (HW) and software (SW) development, component/subsystem Assembly Integration & Test (AI&T) for the CP aircraft. Begins SW and HW In-the-Loop efforts, as well as funding initial GFE planning and Modular Open System Architecture (MOSA) development. Provides funding for Statutory and Regulatory documentation requirements.			
<b>FY 2022 Plans:</b> Continues support of HW and SW development, component/subsystem AI&T, SW and HW In-the-Loop efforts, GFE planning and MOSA development in preparation for final AI&T for CP aircraft. Begins Inc #1 Air Vehicle design and mission systems			



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**Exhibit R-2A, RDT&E Project Justification:** PB 2022 Army **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603801A / Aviation - Adv Dev	<b>Project (Number/Name)</b> F12 / Future Attack Reconnaissance Aircraft
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<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	FY 2020	FY 2021	FY 2022
development. Continues support of documentation requirements for the Program of Record (POR) and supports an Engineering and Manufacturing Development (EMD) Request For Proposal (RFP) release.			
<b><i>FY 2021 to FY 2022 Increase/Decrease Statement:</i></b> Fiscal Year (FY) 2021 Research Development Test & Evaluation (RDT&E) funding increased to meet requirements for the material purchase, tooling development, engineering support and AI&T to prepare for FARA prototype first flight for both performers. The increase in resources also furthers GFE development and Inc #1 Air Vehicle design and mission systems development.			
<b>Accomplishments/Planned Programs Subtotals</b>	377.123	480.758	650.243

<b>C. Other Program Funding Summary (\$ in Millions)</b>											
Line Item	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
• B47: Future Vertical Lift	111.274	213.538	448.412	-	448.412	-	-	-	-	-	-
• A12001: Future Attack Recon Aircraft	-	-	-	-	-	-	-	-	-	-	-
• CK7: FARA Ecosystem	-	-	26.986	-	26.986	-	-	-	-	-	-

**Remarks**  
The FARA Competitive Prototype effort was initiated in FY 2019 with Congressional Add of \$75.400 million under Program Element (PE) 0603801A Aviation - Adv Dev Project B47 Future Vertical Lift, which was shared with Future Long Range Assault Aircraft. FARA requirements will be executed under PE 0603801A Aviation - Adv Dev Project F12 Future Attack Reconnaissance Aircraft from FY 2020 and beyond.

**D. Acquisition Strategy**  
The Future Attack Reconnaissance Aircraft (FARA) program is executing a streamlined acquisition approach leveraging modern tools, processes, industry innovation, and leveraging efficiencies through the Army's modernization enterprise and Cross Functional Team (CFT) framework. The aircraft developed under this program will utilize a modular open system approach, which will enable more efficient and cost effective mission equipment integration throughout the lifecycle of the weapon system.

The Army is executing a two-phased FARA Competitive Prototyping (CP) effort from FY 2019-2023 using Other Transaction Authority for Prototyping (OTAP) with initial awards to five industry performers. The scope of this effort includes prototype design and fabrication process refinement, subsystem and representative system level testing, flight control and mission processor software development and testing, development of systems integration labs, development or modification of test fixtures and facilities, preparation of test plans and reports, the generation of airworthiness documentation, and testing of all processes and subsystems within the prototype aircraft.

The initial design phase, phase one, was awarded in April 2019. Phase two began in March 2020 with two of the five industry performers selected to proceed to final detailed design and the development, integration and test of a flyable prototype air vehicle. Phase two will culminate with a government flight test evaluation of the FARA Competitive Prototype no later than the end of FY 2023.

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**Exhibit R-2A, RDT&E Project Justification:** PB 2022 Army **Date:** May 2021

<b>Appropriation/Budget Activity</b>	<b>R-1 Program Element (Number/Name)</b>	<b>Project (Number/Name)</b>
2040 / 4	PE 0603801A / <i>Aviation - Adv Dev</i>	F12 / <i>Future Attack Reconnaissance Aircraft</i>

The Competitive Prototype effort will inform full FARA Weapon System requirements development process, and will develop the data needed to reduce the risks for full Weapon System design, integration, testing, and qualification to be completed during the FARA EMD phase.

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army** **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603801A / Aviation - Adv Dev	<b>Project (Number/Name)</b> F12 / Future Attack Reconnaissance Aircraft
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<b>Management Services (\$ in Millions)</b>				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
SBIR/STTR Transfer	TBD	Various : Various	-	-		-		26.111	Oct 2021	-		26.111	0.000	26.111	-
PM FARA System Engineering and Program Mangement	Various	Various : Redstone Arsenal, AL	-	11.101		11.030	Mar 2021	22.212	Mar 2022	-		22.212	Continuing	Continuing	Continuing
<b>Subtotal</b>			-	11.101		11.030		48.323		-		48.323	Continuing	Continuing	N/A

<b>Product Development (\$ in Millions)</b>				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Competitive Prototype (CP) Execution - Other Vendors	C/Various	CCDC AvMC : Redstone Arsenal, AL	-	24.016	Mar 2020	-		-		-		-	0.000	24.016	-
Competitive Prototype (CP) Execution - Raider X	C/CS	Sikorsky Aircraft Corporation : Stratford, CT	-	140.000	Apr 2020	201.500	Feb 2021	237.000	Oct 2021	-		237.000	159.500	738.000	-
Competitive Prototype (CP) Execution - 360 Invictus	C/CS	Bell Textron, Inc. : Fort Worth, TX	-	123.800	Apr 2020	187.499	Feb 2021	127.715	Oct 2021	-		127.715	76.157	515.171	-
Inc #1 Air Vehicle Design	C/Various	Various : Various	-	-		-		69.550	Dec 2021	-		69.550	Continuing	Continuing	Continuing
Inc #1 Mission Systems Development	C/Various	Various : Various	-	-		8.335	Jul 2021	69.776	Dec 2021	-		69.776	Continuing	Continuing	Continuing
GFE - Improved Turbine Engine Development - Single Engine Configuration	C/CPIF	PM ATE : Redstone Arsenal	-	13.298	Jun 2020	13.442	Mar 2021	16.670	Dec 2021	-		16.670	Continuing	Continuing	Continuing
GFE - Modular Effects Launcher Development	Various	CCDC AvMC : Redstone Arsenal, AL	-	4.524	May 2020	9.744	Mar 2021	15.560	Dec 2021	-		15.560	Continuing	Continuing	Continuing
GFE - 20mm Cannon Development	Various	CCDC AC : Picatinny Arsenal, NJ	-	13.812	Apr 2020	6.930	Mar 2021	6.200	Dec 2021	-		6.200	Continuing	Continuing	Continuing
GFE - Radar Development	Various	CCDC AvMC : Redstone Arsenal, AL	-	3.009	Mar 2020	3.500	Mar 2021	8.052	Mar 2022	-		8.052	Continuing	Continuing	Continuing

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army** **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603801A / Aviation - Adv Dev	<b>Project (Number/Name)</b> F12 / Future Attack Reconnaissance Aircraft
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<b>Product Development (\$ in Millions)</b>				<b>FY 2020</b>		<b>FY 2021</b>		<b>FY 2022 Base</b>		<b>FY 2022 OCO</b>		<b>FY 2022 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>			
Modular Open System Approach Development	Various	CCDC AvMC : Redstone Arsenal, AL	-	24.316	May 2020	17.972	Mar 2021	28.602	Dec 2021	-		28.602	Continuing	Continuing	Continuing
<b>Subtotal</b>			-	346.775		448.922		579.125		-		579.125	Continuing	Continuing	N/A

<b>Support (\$ in Millions)</b>				<b>FY 2020</b>		<b>FY 2021</b>		<b>FY 2022 Base</b>		<b>FY 2022 OCO</b>		<b>FY 2022 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>			
Engineering Services Support - CP Air Vehicle Dev & Test	MIPR	Redstone Test Center, CCDC-AvMC: : Redstone Arsenal, AL	-	7.246	Mar 2020	1.477	Mar 2021	3.715	Dec 2021	-		3.715	Continuing	Continuing	Continuing
Engineering Services Support - CP Airworthiness	MIPR	CCDC-AvMC-SRD: : Redstone Arsenal, AL	-	7.127	Aug 2020	14.112	Mar 2021	13.500	Mar 2022	-		13.500	Continuing	Continuing	Continuing
Simulation, Studies, and Analysis	Various	Various : Various	-	4.874	Aug 2020	5.217	Mar 2021	5.580	Mar 2022	-		5.580	Continuing	Continuing	Continuing
<b>Subtotal</b>			-	19.247		20.806		22.795		-		22.795	Continuing	Continuing	N/A

<b>Project Cost Totals</b>	<b>Prior Years</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022 Base</b>	<b>FY 2022 OCO</b>	<b>FY 2022 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
-	-	377.123	480.758	650.243	-	650.243	Continuing	Continuing	N/A

**Remarks**  
 Under the Other Transaction Authorities for Prototyping (OTAP), five incrementally funded agreements were awarded in April 2019 which have payments based on performance milestones through Fiscal Year (FY) 2023. There will be no additional contract awards or contract options executed. Funding will be incrementally added to the existing awards by modification as negotiated with each performer. In March 2020, two of the five performers were selected for continued execution through final design, prototype build, and flight testing; the other three performers were issued a stop work order and ceased to receive additional funding.

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**Exhibit R-4, RDT&E Schedule Profile: PB 2022 Army** **Date: May 2021**

<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603801A / Aviation - Adv Dev	<b>Project (Number/Name)</b> F12 / Future Attack Reconnaissance Aircraft
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Event Name	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
FVL CFT 2371b Competitive Prototype (CP) Design	[Redacted]				[Redacted]																							
FVL CFT 2371b CP - Down Select to 2 Performers	Competitive Prototype Design																											
FVL CFT 2371b CP Build	[Redacted]				[Redacted]																							
FVL CFT 2371b CP Test	[Redacted]																											
Milestone B Documentation Dev. and Coord.	[Redacted]				[Redacted]																							
Contract Requirement Package Development	[Redacted]																											
EMD Request for Proposal Release	[Redacted]				[Redacted]																							
EMD Proposal Submission/Evaluation	[Redacted]																											
Milestone B	[Redacted]				[Redacted]																							
EMD Contract Award	[Redacted]																											
EMD Phase	[Redacted]				[Redacted]																							
Weapons System CDR	[Redacted]																											

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603801A / Aviation - Adv Dev	<b>Project (Number/Name)</b> F12 / Future Attack Reconnaissance Aircraft

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
FVL CFT 2371b Competitive Prototype (CP) Design	3	2019	2	2020
FVL CFT 2371b CP - Down Select to 2 Performers	2	2020	2	2020
FVL CFT 2371b CP Build	3	2020	4	2022
FVL CFT 2371b CP Test	1	2023	4	2023
Milestone B Documentation Dev. and Coord.	1	2021	1	2024
Contract Requirement Package Development	1	2021	3	2022
EMD Request for Proposal Release	3	2022	3	2022
EMD Proposal Submission/Evaluation	4	2022	1	2024
Milestone B	1	2024	1	2024
EMD Contract Award	1	2024	1	2024
EMD Phase	1	2024	4	2028
Weapons System CDR	3	2024	3	2024

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**Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Army** **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040: Research, Development, Test & Evaluation, Army / BA 4: Advanced Component Development & Prototypes (ACD&P)	<b>R-1 Program Element (Number/Name)</b> PE 0603804A / Logistics and Engineer Equipment - Adv Dev
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	-	7.081	8.587	7.055	-	7.055	-	-	-	-	-	-
526: Marine Orien Log Eq Ad	-	3.881	0.809	2.493	-	2.493	-	-	-	-	-	-
EW8: Armored Engineer Vehicles	-	-	3.778	4.562	-	4.562	-	-	-	-	-	-
G11: Adv Elec Energy Con Ad	-	3.200	4.000	-	-	-	-	-	-	-	-	-

**A. Mission Description and Budget Item Justification**

This Program Element (PE) supports advanced component development and prototypes of new and improved technologies for combat support and combat service support equipment essential to sustaining combat operations. Advancements in bridging, armored engineer vehicles to include development of a robotic capability Remote Control System for the Assault Breacher Vehicle, electric power generators, material-handling, environmental control, shelter systems, cargo aerial delivery, field service systems, mortuary affairs equipment and petroleum equipment are necessary to improve safety and increase the tactical mobility, operational capability, lethality and survivability on the digital battlefield and to provide for greater sustainment while reducing the logistics support burden. Army Watercraft funding supports initiatives to enhance the seaworthiness, safety, survivability, supportability, energy efficiency, environmental, bulk fuel, water generation, regulatory compliance and reliability of existing systems.

**B. Program Change Summary (\$ in Millions)**

	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022 Base</u>	<u>FY 2022 OCO</u>	<u>FY 2022 Total</u>
Previous President's Budget	7.339	4.761	7.723	-	7.723
Current President's Budget	7.081	8.587	7.055	-	7.055
Total Adjustments	-0.258	3.826	-0.668	-	-0.668
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	4.000			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.258	-0.174			
• Adjustments to Budget Years	-	-	-0.668	-	-0.668

**Congressional Add Details (\$ in Millions, and Includes General Reductions)**

**Project:** G11: Adv Elec Energy Con Ad  
Congressional Add: Contract Activity

FY 2020	FY 2021
0.582	4.000

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2022 Army	<b>Date:</b> May 2021
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<b>Appropriation/Budget Activity</b> 2040: <i>Research, Development, Test &amp; Evaluation, Army / BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0603804A / <i>Logistics and Engineer Equipment - Adv Dev</i>
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**Congressional Add Details (\$ in Millions, and Includes General Reductions)**

	FY 2020	FY 2021
Congressional Add Subtotals for Project: G11	0.582	4.000
Congressional Add Totals for all Projects	0.582	4.000



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**Exhibit R-2A, RDT&E Project Justification:** PB 2022 Army **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603804A / Logistics and Engineer Equipment - Adv Dev	<b>Project (Number/Name)</b> 526 / Marine Orien Log Eq Ad
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
526: Marine Orien Log Eq Ad	-	3.881	0.809	2.493	-	2.493	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

**A. Mission Description and Budget Item Justification**

This project line supports the family of Army Ship to Shore (S2S) connectors that support Dynamic Force Repositioning (DFR) by providing the Combatant, Multi-Domain Operations (MDO) and Joint All Domain Operations (JADO) Commanders with the ability to access multiple entry points via littorals and inland waterways (waterborne corridor) IOT sustain forces within an anti-access/area denial (A2/AD) bubble. The family of S2S connectors include the Maneuver Support Vessel (Light) and the Ship to Shore / Over the Shore Logistics Vessel (SSLV), which are the Army's first digital architecture vessels (with improved draft, speed, and payload) and critical modernization efforts in support of the Army's Watercraft Systems Transformation Strategy (AWSTS). S2S connectors will provide Surge, Precision and Dispersed Logistics to move and maneuver tailored forces, combat ready troops, platforms, equipment, and supply bulk fuel and water across the full spectrum of operations. S2S connectors mitigate A2/AD threats by providing access to shallow coastal waters, rivers, in narrow inland waterways in support of dispersed force elements in austere environments and where mature ports or road networks are unavailable.

In general, all Army Watercraft funding supports initiatives to enhance the seaworthiness, safety, and survivability while increasing the lethality, tactical mobility, and operational capability of the Army Mariner to preserve the Combatant Commanders requirement of "freedom of seas" access in all areas of the world particularly the littorals, to support maneuver operations in all Areas of Responsibility. All modification and services efforts are critical enablers for the success Army's Watercraft Systems Transformation Strategy (AWSTS) and continued fulfillment of the AWS Title 10 mission.

In addition, funded efforts will address critical gaps in these areas for the legacy fleet, while at the same time researching, developing and testing emergent technologies. To support future acquisitions and future fleet planning, funding efforts will include conducting trade studies, Business Case Analyses to inform the requirement development process, and support Analysis of Alternatives (AoA). The funding enables Army's compliance with the National Defense Authorization Act of 1996 and 502(6) of the Clean Water Act and compliance with Environmental protection Agency (EPA) emission standards.

FY 2022 RDTE dollars in the amount of \$2.493 million supports modernization of the legacy fleet by investigating technology insertions, including, but not limited to: force protection, prognostics & preventative maintenance, vessel electronics, autonomous operations and other emerging technologies. Funding also supports developing initial prototypes to enable refinement of Operational Requirements and early user feedback to support future sustainment and operational movement operating concepts.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	FY 2020	FY 2021	FY 2022
<b>Title:</b> At Sea Transfer Technology	1.968	-	-
<b>Description:</b> At Sea Transfer Technology enables roll on and roll off (RO/RO) capability from vessels at sea and causeway transport of vehicles and equipment to the beach or shore. The current effort serves to inform development of a Service Life			

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army		<b>Date:</b> May 2021		
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603804A / Logistics and Engineer Equipment - Adv Dev	<b>Project (Number/Name)</b> 526 / Marine Oriented Log Eq Ad		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
Extension Program (SLEP) for the Modular Warping Tug (MWT) and Causeway Ferry (CF) which are principle working platforms in the Modular Causeway System (MCS).				
<p><b>Title:</b> Environmental Compliance Projects</p> <p><b>Description:</b> Environmental projects enable compliance with requirements as defined under in the law Uniform National Discharge Standards (UNDS) and Environmental Protection Agency (EPA) emissions standards. The EPA reviews the UNDS Code of Federal Regulations (CFR) language in five-year increments separated into three batches (types of discharge). This is an ongoing assessment of statutory language which may or may not result in material solution change.</p> <p><b>FY 2021 Plans:</b> Identification of Environmental Compliance Technologies IAW evolving statutory and regulatory requirements and ensure ships are compliant. This accomplishment will also fund Navy efforts for UNDS analysis and committee representation.</p> <p><b>FY 2022 Plans:</b> Batch Three, Phase III - Army UNDS Implementation documentation update</p> <p><b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> Decrease due to the completion of support to establish Performance standards for Batch Three discharges and development of Implementation of DOD instruction for the Mariners.</p>		0.060	0.095	0.045
<p><b>Title:</b> Force Protection Capability</p> <p><b>Description:</b> Army Watercraft Systems (AWS) Force Protection capability is limited to defensive measures. Current efforts include development of gunner station and weapon station locations, integration of Common Remotely Weapon Station (CROWS) and non-lethal Escalation of Force (EoF). The EoF capability includes white light, green dazzler, an acoustic hailing device, percussion grenades, and Forward Looking Infra-Red (FLIR) cameras.</p> <p><b>FY 2021 Plans:</b> Providing support to design, install, and test CROWS aboard LCU watercraft fleet. The EoF capabilities could include, but are not limited to, white light, green dazzler, an acoustic hailing device, percussion grenades, and Electro-Optical / Infrared (EO/IR) capabilities.</p> <p><b>FY 2022 Plans:</b></p>		1.575	0.414	1.597

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army		<b>Date:</b> May 2021		
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603804A / Logistics and Engineer Equipment - Adv Dev	<b>Project (Number/Name)</b> 526 / Marine Orient Log Eq Ad		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
Provide support to complete design, prototype install, test, and final TDP for the CROWS aboard LCU watercraft fleet. The EoF capabilities could include, but are not limited to, white light, green dazzler, an acoustic hailing device, percussion grenades, sub surface surveillance, and Electro-Optical / Infrared (EO/IR) capabilities.  <b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> Additional funding in FY 2022 is to finalize LCU CROWS design and to kick off efforts to investigate sub-surface surveillance.				
<b>Title:</b> Army Watercraft Program Support  <b>Description:</b> Matrix Salary Support includes Program Management and System Engineering resources required to manage the program projects and provide contractor oversight. It also includes benefits, travel, personnel training and other Government costs required to retain a professional acquisition workforce.  <b>FY 2021 Plans:</b> Providing MWT Engineering test support as well as engineering and Naval support for the Fleet.  <b>FY 2022 Plans:</b> Provide engineering support for C5ISR Studies and Force Protection design work.  <b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> Increase due to design, install, and test CROWS aboard watercraft fleet.		0.278	0.300	0.307
<b>Title:</b> Trade Studies and Business Analyses  <b>Description:</b> Conduct Affordability and Feasibility Studies for concept development concept development for future vessel platforms.  <b>FY 2022 Plans:</b> Initiation of human factor engineer analysis and initiation of electrical power studies to support Command, Control, Communications, Computers, Intelligence, Surveillance and Reconnaissance (C5ISR) upgrades and joint operation capabilities for legacy vessels.  <b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> An increase in the budget allows for initiating these studies in FY22 to inform design decisions for future Modernized Integrated Bridge System (MIBS) technology refreshes in FY23 and beyond.		-	-	0.544
<b>Accomplishments/Planned Programs Subtotals</b>		3.881	0.809	2.493

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603804A / <i>Logistics and Engineer Equipment - Adv Dev</i>	<b>Project (Number/Name)</b> 526 / <i>Marine Oriented Log Eq Ad</i>

**C. Other Program Funding Summary (\$ in Millions)**

Line Item	FY 2020	FY 2021	FY 2022	FY 2022	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026	Cost To	
			Base	OCO	Total					Complete	Total Cost
• MA4501: <i>MODIFICATION KITS</i>	48.916	53.386	21.300	-	21.300	-	-	-	-	-	-
• MA4502: <i>INSTALLATION OF MODIFICATIONS</i>	14.109	5.251	5.574	-	5.574	-	-	-	-	-	-
• M11101: <i>Army Watercraft Esp</i>	42.232	40.910	44.409	-	44.409	-	-	-	-	-	-
• ML5355: <i>Items Less Than \$5.0M (Float/Rail)</i>	6.920	1.844	-	-	-	-	-	-	-	-	-

**Remarks**

FY 2020 Accomplishments:

- LSV 7 Escalation of Force (EOF) Preliminary Design Review
- MCS SLEP Test Readiness Review
- Initiated MCS SLEP Developmental Test
- Initiated development of EO/IR capability for LSV and LCU
- Completed Identification of Environmental Compliance Technologies IAW evolving statutory and regulatory requirements

**D. Acquisition Strategy**

Leverage government and public research centers Ground Vehicle Systems Center (GVSC), Naval Surface Warfare Center (NSWC) Philadelphia, AWS System Technical Support (STS) contractor (McKean Defense) and known public research institutes (Battelle) along with associated contract mechanisms to prototype, test, and evaluate component technologies that may be applicable to the current and future Army Watercraft fleet.

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army** **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603804A / Logistics and Engineer Equipment - Adv Dev	<b>Project (Number/Name)</b> 526 / Marine Oriented Log Eq Ad
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<b>Product Development (\$ in Millions)</b>				<b>FY 2020</b>		<b>FY 2021</b>		<b>FY 2022 Base</b>		<b>FY 2022 OCO</b>		<b>FY 2022 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>			
Force Protection, Escalation of Force (EoF) Development (i.e. CROWS)	MIPR	TARDEC : Warren, MI	3.268	1.575	Feb 2020	0.414	Nov 2020	1.597	Nov 2021	-		1.597	Continuing	Continuing	-
At Sea Transfer Systems (Modular Warping Tug / Causeway Ferry)	SS/CPFF	TARDEC DTIC - I, Battelle : Fort Belvoir, VA	7.498	1.968	Nov 2019	-		-		-		-	0.000	9.466	-
Environmental Compliance Uniform National Discharge Standards (UNDS)	MIPR	Carderock : Maryland and Pennsylvania	3.281	0.060	Dec 2019	0.095	Nov 2020	0.045	Nov 2021	-		0.045	Continuing	Continuing	-
Trade Study Analyses	TBD	TBD : TBD	-	-		-		0.544	Feb 2022	-		0.544	Continuing	Continuing	-
<b>Subtotal</b>			14.047	3.603		0.509		2.186		-		2.186	Continuing	Continuing	N/A

<b>Support (\$ in Millions)</b>				<b>FY 2020</b>		<b>FY 2021</b>		<b>FY 2022 Base</b>		<b>FY 2022 OCO</b>		<b>FY 2022 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>			
Army Watercraft Program Support	MIPR	Detroit Arsenal PMs, TARDEC, NAVSEA Carderock : Maryland, Warren, MI	2.069	0.278	Dec 2019	0.300	Dec 2020	0.307	Dec 2021	-		0.307	Continuing	Continuing	-
<b>Subtotal</b>			2.069	0.278		0.300		0.307		-		0.307	Continuing	Continuing	N/A

<b>Project Cost Totals</b>	<b>Prior Years</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022 Base</b>	<b>FY 2022 OCO</b>	<b>FY 2022 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
	16.116	3.881	0.809	2.493	-	2.493	Continuing	Continuing	N/A

**Remarks**  
 COVID19: The COVID19 pandemic is driving significant cost increases across the shipbuilding industry (absenteeism, demand for skilled trades, safety protocols, and reliance on sub-contractor TDY). Although vaccinations could potentially mitigate some risks, the Army will continue to monitor the situation closely.

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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2022 Army</b>			<b>Date: May 2021</b>		
<b>Appropriation/Budget Activity</b> 2040 / 4		<b>R-1 Program Element (Number/Name)</b> PE 0603804A / Logistics and Engineer Equipment - Adv Dev		<b>Project (Number/Name)</b> 526 / Marine Oriented Log Eq Ad	

Event Name	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Army Watercraft Program Support	[Blue bar]																											
Force Protection: Common Remotely Operated Weapon Station	[Blue bar]																											
Force Protection: CROWS on LSV Class	[Blue bar]																											
Force Protection: CROWS on LCU Class	[Blue bar]																											
At Sea Transfer Technology (MCS)	[Blue bar]																											
Modular Warping Tug (MWT) / Causeway Ferry (CF)	[Blue bar]																											
MWT / CF - SLEP Prototype and Proof Concept	[Blue bar]																											
MWT / CF - SLEP Testing	[Blue bar]																											
Environmental Compliance	[Blue bar]																											
Uniformed National Discharge Standards (UNDS)	[Blue bar]																											
UNDS Batch 2	[Blue bar]																											
UNDS Batch 3	[Blue bar]																											
Trade Studies and Business Analyses	[Blue bar]																											

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<b>Exhibit R-4A, RDT&amp;E Schedule Details: PB 2022 Army</b>		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603804A / <i>Logistics and Engineer Equipment - Adv Dev</i>	<b>Project (Number/Name)</b> 526 / <i>Marine Oriented Log Eq Ad</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Army Watercraft Program Support	1	2018	4	2026
Force Protection: Common Remotely Operated Weapon Station (CROWS)	1	2018	4	2026
Force Protection: CROWS on LSV Class	1	2018	2	2022
Force Protection: CROWS on LCU Class	1	2018	4	2023
At Sea Transfer Technology (MCS)	1	2018	1	2021
Modular Warping Tug (MWT) / Causeway Ferry (CF)	1	2018	1	2021
MWT / CF - SLEP Development Contract	4	2018	4	2018
MWT / CF - SLEP Prototype and Proof Concept	1	2018	4	2020
MWT / CF - SLEP Testing	1	2020	4	2020
Environmental Compliance	1	2018	4	2026
Uniformed National Discharge Standards (UNDS)	1	2018	4	2026
UNDS Batch 2	4	2020	4	2020
UNDS Batch 3	4	2022	4	2022
Trade Studies and Business Analyses	4	2019	4	2026

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**Exhibit R-2A, RDT&E Project Justification:** PB 2022 Army **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4					<b>R-1 Program Element (Number/Name)</b> PE 0603804A / Logistics and Engineer Equipment - Adv Dev				<b>Project (Number/Name)</b> EW8 / Armored Engineer Vehicles			
COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
EW8: Armored Engineer Vehicles	-	-	3.778	4.562	-	4.562	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

This project supports a new start effort for the prototype development, test and evaluation of a robotic capability Remote Control System (RCS) for the Assault Breacher Vehicle (ABV), to include prototype fabrication, developmental testing, operational testing and logistics demonstration / user test events. This project also supports live fire test and evaluation, initial operational test and evaluation and production qualification testing of the Joint Assault Bridge (JAB).

Funding supports modernization of Army Bridging and Armored Engineer Vehicle fleets by investigating technology insertions including, but not limited to: condition based maintenance, increased military load capacities, autonomous operations and other emerging technologies. Funding also supports developing initial prototypes and testing to enable refinement of Operational Requirements and early user feedback to support future sustainment and operational movement operating concepts.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	FY 2020	FY 2021	FY 2022
<b>Title:</b> Assault Breacher Vehicle (ABV) Remote Control System (RCS)	-	3.778	4.562
<b>FY 2021 Plans:</b> New start effort. Funding supports a Remote Control System (RCS) capability for the Assault Breacher Vehicle (ABV). Refurb of the ABV assets required for ABV RCS development and testing must be completed. Funding also provides for Systems Engineering Project Management (SEPM) matrix functional support.			
<b>FY 2022 Plans:</b> Funding supports the continuation of refurb of ABV systems, the fabrication of four (4) RCS prototypes and the completion of one (1) User Jury event to update design. Funding also provides for SEPM matrix functional support.			
<b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> Increased funding in this line is required for ABV RCS Prototypes & fabrication and a User Jury as well as SEPM matrix support.			
<b>Accomplishments/Planned Programs Subtotals</b>	-	3.778	4.562

**C. Other Program Funding Summary (\$ in Millions)**

Line Item	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
• G82925: Assault Breacher Vehicle	31.697	19.500	-	-	-	-	-	-	-	-	-



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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603804A / <i>Logistics and Engineer Equipment - Adv Dev</i>	<b>Project (Number/Name)</b> EW8 / <i>Armored Engineer Vehicles</i>

**C. Other Program Funding Summary (\$ in Millions)**

<u>Line Item</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022</u> <u>Base</u>	<u>FY 2022</u> <u>OCO</u>	<u>FY 2022</u> <u>Total</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>FY 2026</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
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**Remarks**

**D. Acquisition Strategy**

Funding will support RDT&E efforts for testing and follow-on production of Assault Bridging system. The Assault Breacher Vehicle (ABV) Remote Control System (RCS) program will pursue a competitive prototype development and testing strategy with multiple vendors to select an RCS materiel solution for production and integration into the ABV system. Prototypes will be developed and refined through one User Jury event in 2022. Competitive testing be used to down-select to one design.

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army** **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603804A / Logistics and Engineer Equipment - Adv Dev	<b>Project (Number/Name)</b> EW8 / Armored Engineer Vehicles
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<b>Management Services (\$ in Millions)</b>				<b>FY 2020</b>		<b>FY 2021</b>		<b>FY 2022 Base</b>		<b>FY 2022 OCO</b>		<b>FY 2022 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>			
ABV RCS Matrix Functional Support	MIPR	Various : Various	0.929	-		0.357	Dec 2020	0.921	Nov 2021	-		0.921	0.000	2.207	-
<b>Subtotal</b>			0.929	-		0.357		0.921		-		0.921	0.000	2.207	N/A

<b>Product Development (\$ in Millions)</b>				<b>FY 2020</b>		<b>FY 2021</b>		<b>FY 2022 Base</b>		<b>FY 2022 OCO</b>		<b>FY 2022 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>			
AME Analysis of Alternatives (AOA)	C/FFP	TBD : TBD	1.285	-		-		-		-		-	0.000	1.285	-
JAB Force Protection Development and Fabrication	SS/FFP	DRS SUSTAINMENT SYSTEMS, INC. : SAINT LOUIS, MO	2.084	-		-		-		-		-	0.000	2.084	-
ABV RCS Prototype Development and Fabrication	TBD	TBD : TBD	-	-		-		3.611	Oct 2021	-		3.611	0.000	3.611	-
ABV RCS Refurbishment of ABV assets for testing	MIPR	Anniston Army Depot : Anniston AL	-	-		3.421	Jun 2021	-		-		-	0.000	3.421	-
<b>Subtotal</b>			3.369	-		3.421		3.611		-		3.611	0.000	10.401	N/A

<b>Test and Evaluation (\$ in Millions)</b>				<b>FY 2020</b>		<b>FY 2021</b>		<b>FY 2022 Base</b>		<b>FY 2022 OCO</b>		<b>FY 2022 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>			
JAB Initial Operational Test & Evaluation (IOTE)	MIPR	Operational Test Command : Ft. Hood, TX	5.214	-		-		-		-		-	0.000	5.214	-
JAB Production Qualification Testing (PQT)	MIPR	Aberdeen Test Center : Aberdeen Proving Grounds, MD	3.936	-		-		-		-		-	0.000	3.936	-

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army** **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603804A / <i>Logistics and Engineer Equipment - Adv Dev</i>	<b>Project (Number/Name)</b> EW8 / <i>Armored Engineer Vehicles</i>
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<b>Test and Evaluation (\$ in Millions)</b>				<b>FY 2020</b>		<b>FY 2021</b>		<b>FY 2022 Base</b>		<b>FY 2022 OCO</b>		<b>FY 2022 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>			
JAB Prototype Live Fire Validation	MIPR	Aberdeen Test Center : Aberdeen Proving Grounds, MD	1.500	-		-		-		-		-	0.000	1.500	-
JAB Logistics Demonstration	TBD	Army Operational Test Command (AOTC) : Ft. Hood, TX	0.270	-		-		-		-		-	0.000	0.270	-
ABV RCS User Jury	MIPR	TBD : TBD	-	-		-		0.030		-		0.030	0.000	0.030	-
<b>Subtotal</b>			10.920	-		-		0.030		-		0.030	0.000	10.950	N/A
<b>Project Cost Totals</b>			15.218	-		3.778		4.562		-		4.562	0.000	23.558	N/A

**Remarks**

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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2022 Army</b>		<b>Date: May 2021</b>
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603804A / <i>Logistics and Engineer Equipment - Adv Dev</i>	<b>Project (Number/Name)</b> EW8 / <i>Armored Engineer Vehicles</i>

Event Name	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026							
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4				
<b>Assault Breacher Vehicle (ABV) Remote Control System (RCS)</b>									1 ▲ ABV RCS RPP																							
ABV RCS Request for Prototype Proposals																																
ABV RCS Prototype Development													2 ▲ ABV RCS Awd	3 ▲ ABV RCS User Jury													4 ▲ ABV RCS Awd					
ABV RCS User Jury													ABV RCS Awd	ABV RCS User Jury													ABV RCS Awd					
ABV RCS Prototype Awards 2 vendors																																
ABV RCS Production Source Selection																																
ABV RCS Contract Award																																
ABV RCS Developmental Test / Operational Test																																
ABV RCS Downselect Decision																																
ABV RCS Developmental Test / Operational Test																																
ABV RCS DT/OT/LFT&E																																
ABV RCS DT/OT/LFT&E																																

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603804A / <i>Logistics and Engineer Equipment - Adv Dev</i>	<b>Project (Number/Name)</b> EW8 / <i>Armored Engineer Vehicles</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Assault Breacher Vehicle (ABV) Remote Control System (RCS)	1	2021	2	2026
ABV RCS Request for Prototype Proposals	1	2022	1	2022
ABV RCS Prototype Development	3	2022	4	2023
ABV RCS User Jury	1	2023	1	2023
ABV RCS Prototype Awards 2 vendors	2	2022	2	2022
ABV RCS Production Source Selection	2	2023	3	2023
ABV RCS Contract Award	1	2025	1	2025
ABV RCS Developmental Test / Operational Test	3	2024	3	2026

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**Exhibit R-2A, RDT&E Project Justification:** PB 2022 Army **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603804A / Logistics and Engineer Equipment - Adv Dev	<b>Project (Number/Name)</b> G11 / Adv Elec Energy Con Ad
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
G11: Adv Elec Energy Con Ad	-	3.200	4.000	-	-	-	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

**A. Mission Description and Budget Item Justification**

This Project supports the Army Network Modernization Strategy Line of Effort #4, Command Post (CP). The technologies in this portfolio are specifically designed to target CP challenges to enable power resilience across the operational spectrum and to resolve issues with setup and tear-down times and with the CP mobility and footprint. Additionally, this project supports enablers of the Integrated Visual Augmentation System (IVAS) which is a priority technology for the Network and Soldier Lethality CFT's.

As the DoD's Lead Standardization Activity for Tactical Electric Power (TEP), Project Manager Expeditionary Energy & Sustainment Systems (PM E2S2) matures and integrates technology that will improve the next generation of standard tactical power sources in support of all Services. It supports technical maturation of TEP systems that will extend Army operational mission reach and duration in support of the Army Operating Concept and Multi-Domain Battle.

Funding supports modernization of the current Tactical Electric Power capability with technology insertions including, but not limited to hybrid capabilities, light-weight power solutions, vehicle/tactical microgrid interoperability and Tactical Microgrid Standards (TMS). Funding also supports developing initial prototypes to enable refinement of Operational Requirements and early user feedback to support future sustainment an operational energy concepts.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	FY 2020	FY 2021	FY 2022
<b>Title:</b> Government System Test and Evaluation	1.010	-	-
<b>Description:</b> Supports in house and external performance tests of concept hardware. In addition, supports evaluation of systems at Network Integration Evaluation (NIE) and evaluation of systems at larger events such as Army Expeditionary Warrior Experiment (AEWE) and Joint Warfighting Assessment (JWA).			
<b>Title:</b> Other Contracts and Government agencies	1.583	-	-
<b>Description:</b> Matrix engineering and analysis support for continued development of technology supporting the STEP program, PDISE, and CPI2, as well as analysis and data management.			
<b>Title:</b> Government Program Management	0.025	-	-
<b>Description:</b> Continue development of technology supporting the STEP program, PDISE and CPI2.			
<b>Accomplishments/Planned Programs Subtotals</b>	2.618	-	-

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**Exhibit R-2A, RDT&E Project Justification:** PB 2022 Army **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603804A / <i>Logistics and Engineer Equipment - Adv Dev</i>	<b>Project (Number/Name)</b> G11 / <i>Adv Elec Energy Con Ad</i>
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	<b>FY 2020</b>	<b>FY 2021</b>
<b>Congressional Add:</b> Contract Activity	0.582	4.000
<b>FY 2020 Accomplishments:</b> Build infrastructure prototypes to enable optimized use of existing microgrid technologies. Build prototypes to integrate command post vehicle power with Tactical Electric Power systems. Build prototypes to validate feasibility of integrating energy storage with existing TEP systems to address areas of efficiency, reliability, and footprint. Perform front end analysis to assess viability of forward-deployed, mobile nuclear power plants.		
<b>FY 2021 Plans:</b> Execution of FY21 congressional funding to develop lightweight, portable power generation.		
<b>Congressional Adds Subtotals</b>	0.582	4.000

**C. Other Program Funding Summary (\$ in Millions)**

Line Item	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
• 194: <i>Engine Driven Gen Ed</i>	8.050	8.916	17.217	-	17.217	-	-	-	-	-	-
• MA9800: <i>Generators And Associated Equip</i>	115.912	101.239	47.606	-	47.606	-	-	-	-	-	-

**Remarks**

**D. Acquisition Strategy**

Complete advanced development pre-Milestone B technology assessments and analysis, and transition products to Engineering and Manufacturing Development (EMD) phase (Milestone B) and subsequent transition to production (Milestone C). Support concept development and demonstration efforts. Products and technologies supported include tactical power and energy sources, alternative/renewable energy systems, power distribution components, and power management and distribution control systems. Perform analysis of Operational Energy related impacts to future development programs to better direct United States Army Combat Capabilities Development Command (CCDC) efforts.

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army** **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603804A / Logistics and Engineer Equipment - Adv Dev	<b>Project (Number/Name)</b> G11 / Adv Elec Energy Con Ad
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<b>Management Services (\$ in Millions)</b>				<b>FY 2020</b>		<b>FY 2021</b>		<b>FY 2022 Base</b>		<b>FY 2022 OCO</b>		<b>FY 2022 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>			
Platoon Power Generation	MIPR	PM E2S2 : Ft. Belvoir, VA	0.100	-		-		-		-		-	Continuing	Continuing	Continuing
Small Tactical Electric Power (STEP) Components	MIPR	PM E2S2 : Fort Belvoir, VA	0.990	0.040		-		-		-		-	Continuing	Continuing	Continuing
Hybrid Power Sources Components	MIPR	PM E2S2 : Ft. Belvoir, VA	0.942	0.077		-		-		-		-	Continuing	Continuing	Continuing
Power Management and Distribution Systems	MIPR	PM E2S2 : Ft. Belvoir, VA	1.883	0.101		-		-		-		-	Continuing	Continuing	Continuing
Operational Energy	MIPR	PM E2S2 : Fort Belvoir, VA	1.810	-		-		-		-		-	Continuing	Continuing	Continuing
<b>Subtotal</b>			5.725	0.218		-		-		-		-	Continuing	Continuing	N/A

<b>Product Development (\$ in Millions)</b>				<b>FY 2020</b>		<b>FY 2021</b>		<b>FY 2022 Base</b>		<b>FY 2022 OCO</b>		<b>FY 2022 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>			
Platoon Power Generation	MIPR	CERDEC : Fort Belvoir, VA	0.750	-		-		-		-		-	Continuing	Continuing	Continuing
Small Tactical Electric Power (STEP) Components	Various	CERDEC : Fort Belvoir, VA	4.331	0.090		4.000		-		-		-	Continuing	Continuing	Continuing
Hybrid Power Sources Components	Various	Multiple Vendors : TBD	2.875	0.170		-		-		-		-	Continuing	Continuing	Continuing
Power Management and Distribution Systems	Various	CERDEC : Fort Belvoir, VA	5.936	0.334		-		-		-		-	Continuing	Continuing	Continuing
Operational Energy	TBD	TBD : TBD (FY15)	3.158	-		-		-		-		-	Continuing	Continuing	Continuing
Metering and Monitoring Demo	Various	TBD : TBD	0.455	-		-		-		-		-	Continuing	Continuing	Continuing
<b>Subtotal</b>			17.505	0.594		4.000		-		-		-	Continuing	Continuing	N/A



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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army** **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603804A / Logistics and Engineer Equipment - Adv Dev	<b>Project (Number/Name)</b> G11 / Adv Elec Energy Con Ad
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<b>Support (\$ in Millions)</b>				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Small Tactical Electric Power (STEP) Components	MIPR	CERDEC : Fort Belvoir, VA	2.259	0.236		-		-		-		-	Continuing	Continuing	Continuing
Hybrid Power Sources Components	MIPR	CERDEC : Fort Belvoir, VA	1.819	0.436		-		-		-		-	Continuing	Continuing	Continuing
Power Management and Distribution Control Systems	MIPR	CERDEC : Fort Belvoir, VA	2.236	0.696		-		-		-		-	Continuing	Continuing	Continuing
Platoon Power Generation	MIPR	CERDEC : Fort Belvoir, VA	0.101	-		-		-		-		-	Continuing	Continuing	Continuing
Modular Power	MIPR	Idaho National Labs; Air Force Civil Engineer Center : xxxx	3.000	-		-		-		-		-	Continuing	Continuing	Continuing
Operational Energy	MIPR	Dept of Energy Sandia National Labs : Washington DC	1.857	-		-		-		-		-	Continuing	Continuing	Continuing
<b>Subtotal</b>			11.272	1.368		-		-		-		-	Continuing	Continuing	N/A

<b>Test and Evaluation (\$ in Millions)</b>				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Platoon Power Generation (PPG)	MIPR	CERDEC : Fort Belvoir, VA	0.250	-		-		-		-		-	Continuing	Continuing	Continuing
Small Tactical Electric Power (STEP) Components	MIPR	CERDEC : Fort Belvoir, VA	1.530	0.439		-		-		-		-	Continuing	Continuing	Continuing
Hybrid Power Sources Components	MIPR	CERDEC : Fort Belvoir, VA	0.829	0.581		-		-		-		-	Continuing	Continuing	Continuing
Power Management and Distribution Systems	MIPR	CERDEC : Fort Belvoir, VA	2.011	-		-		-		-		-	Continuing	Continuing	Continuing



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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2022 Army</b>		<b>Date: May 2021</b>
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603804A / <i>Logistics and Engineer Equipment - Adv Dev</i>	<b>Project (Number/Name)</b> G11 / <i>Adv Elec Energy Con Ad</i>

Event Name	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
<b>SMALL TACTICAL ELECTRIC POWER (STEP) PROGRAM</b>																												
Assess Technologies, such as STEP, to Meet Gaps-STEP	█																											
Develop prototypes for modular, scalable STEP systems	█																											
<b>AMMPS Hybrid Power Integration</b>																												
AMMPS Hybrid Technology Assessment	█																											
AMMPS Hybrid Prototype Development	█																											
<b>PDISE Expansion</b>																												
TMS interface & test methodology development	█																											
<b>ASSESSMENT OF TECHNOLOGIES Across TEP line</b>																												
Assess Technologies (remote start adapter) to Meet Gaps and	█																											
<b>Lightweight portable power</b>																												
Modeling, Development and Test of lightweight portable power	█																											

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603804A / <i>Logistics and Engineer Equipment - Adv Dev</i>	<b>Project (Number/Name)</b> G11 / <i>Adv Elec Energy Con Ad</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
SMALL TACTICAL ELECTRIC POWER (STEP) PROGRAM	1	2016	4	2020
Assess Technologies, such as STEP, to Meet Gaps-STEP	1	2016	2	2020
Develop prototypes for modular, scalable STEP systems	2	2020	4	2020
AMMPS Hybrid Power Integration	1	2020	2	2020
AMMPS Hybrid Technology Assessment	1	2020	2	2020
AMMPS Hybrid Prototype Development	3	2019	4	2020
PDISE Expansion	1	2017	2	2021
TMS interface & test methodology development	1	2019	2	2021
ASSESSMENT OF TECHNOLOGIES Across TEP line	1	2017	4	2020
Assess Technologies (remote start adapter) to Meet Gaps and Improve Efficiencies	1	2017	4	2020
OPERATIONAL ENERGY (OE)	1	2016	4	2019
Evaluation of OE-Related Impacts, Systems and Improvements	1	2016	4	2019
Lightweight portable power	2	2021	4	2022
Modeling, Development and Test of lightweight portable power	2	2021	4	2022

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**Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Army** **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040: Research, Development, Test & Evaluation, Army / BA 4: Advanced Component Development & Prototypes (ACD&P)	<b>R-1 Program Element (Number/Name)</b> PE 0603807A / Medical Systems - Adv Dev
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	-	36.307	33.085	22.071	-	22.071	-	-	-	-	-	-
808: DoD Drug & Vacc Ad	-	10.903	10.547	6.477	-	6.477	-	-	-	-	-	-
811: Mil HIV Vac&Drug Dev	-	5.236	4.912	-	-	-	-	-	-	-	-	-
836: Field Medical Systems Advanced Development	-	13.587	17.335	15.594	-	15.594	-	-	-	-	-	-
FF4: Counterdrug, DDR, Sys Development & Demonstration	-	0.500	-	-	-	-	-	-	-	-	-	-
VST: MEDEVAC Mission Equipment Package (MEP) - Adv Dev	-	6.081	0.291	-	-	-	-	-	-	-	-	-

**A. Mission Description and Budget Item Justification**

This Program Element (PE) funds development of medical materiel within the early system integration portion of the System Development and Demonstration phase of the acquisition life cycle using 6.4 (Advanced Component Development and Prototype) funding. Program efforts support transition of promising Science and Technology candidate medical technologies (drugs, vaccines, medical devices, diagnostics, and mechanisms for detection and control of disease carrying insects) to larger scale testing in humans for safety and effectiveness. Programs are aligned to meet future force requirements identified within concept documents and organizational structures. This PE also provides funding for Food and Drug Administration (FDA) regulated human clinical trials to gain additional information about safety and effectiveness on the path to licensure for use in humans. These efforts are managed by U.S. Army Medical Materiel Development Activity (USAMMDA) and U.S. Army Medical Materiel Agency (USAMMA) of the U.S. Army Medical Research and Materiel Command.

**B. Program Change Summary (\$ in Millions)**

	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022 Base</u>	<u>FY 2022 OCO</u>	<u>FY 2022 Total</u>
Previous President's Budget	36.975	28.520	37.008	-	37.008
Current President's Budget	36.307	33.085	22.071	-	22.071
Total Adjustments	-0.668	4.565	-14.937	-	-14.937
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	5.500			
• Congressional Directed Transfers	-	-			
• Reprogrammings	0.500	-			
• SBIR/STTR transfer	-1.168	-0.935			
• Adjustments to Budget Years	-	-	-14.937	-	-14.937

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2022 Army **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040: <i>Research, Development, Test &amp; Evaluation, Army / BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0603807A / <i>Medical Systems - Adv Dev</i>
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**Congressional Add Details (\$ in Millions, and Includes General Reductions)**

**Project:** 836: *Field Medical Systems Advanced Development*

Congressional Add: *Program increase - composite shelter*

Congressional Add Subtotals for Project: 836

**Project:** VS7: *MEDEVAC Mission Equipment Package (MEP) - Adv Dev*

Congressional Add: *Transport Telemedicine*

Congressional Add Subtotals for Project: VS7

Congressional Add Totals for all Projects

	FY 2020	FY 2021
	-	5.500
Congressional Add Subtotals for Project: 836	-	5.500
	5.800	-
Congressional Add Subtotals for Project: VS7	5.800	-
Congressional Add Totals for all Projects	5.800	5.500

**Change Summary Explanation**

Needs an explanation for FY22 decrease

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army										<b>Date:</b> May 2021		
<b>Appropriation/Budget Activity</b> 2040 / 4					<b>R-1 Program Element (Number/Name)</b> PE 0603807A / <i>Medical Systems - Adv Dev</i>				<b>Project (Number/Name)</b> 808 / <i>DoD Drug &amp; Vacc Ad</i>			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022 Base</b>	<b>FY 2022 OCO</b>	<b>FY 2022 Total</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>FY 2026</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
808: <i>DoD Drug &amp; Vacc Ad</i>	-	10.903	10.547	6.477	-	6.477	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

This Project funds development of candidate medical countermeasures for infectious diseases of military relevance. These efforts are in: vaccines, drugs, diagnostic kits/ devices. These funds support human clinical effectiveness (capacity to produce a desired size of an effect under ideal or optimal conditions) trials of the drug/vaccine in larger groups that are designed to assess how well the drug/vaccine works and continue safety assessments in a larger group of volunteers. Funding supports both technical evaluations and human clinical testing to assure the safety and effectiveness of medical diagnostic kits and devices. This work, which is performed in military laboratories or civilian pharmaceutical firms, is directed toward the prevention of disease, early diagnosis, and accelerated recovery time once diagnosed to enhance battlefield readiness. All clinical trials are conducted in accordance with United States (U.S.) Food and Drug Administration (FDA) regulations, a mandatory obligation for all military products placed into the hands of medical providers or service members. Product development priorities are determined based upon four major factors: (1) the extent and threat of the disease within the Combatant Commands theater of operations, (2) the clinical severity of the disease, (3) the technical maturity of the proposed solution, and (4) the affordability of the solution (development and production). Products from this Project will transition to PE 0604807A/Project 849 at MS B.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
<b>Title:</b> DoD Drug and Vaccine Advanced Development	10.903	10.547	-
<b>Description:</b> Funding is provided for the development of candidate medical countermeasures for military relevant infectious disease focusing on prevention, early diagnosis and accelerated recovery time. Funding supports both technical evaluations and human clinical testing to assure the safety and effectiveness of drugs, vaccines, medical diagnostic kits and devices.			
<b>FY 2021 Plans:</b> Treatment for Resistant Infections ? Antifungal Drug (formerly Treatment for Resistant Infections): Will monitor technical maturity of candidate treatments for evidence of safety and efficacy in relevant animal models.  Malaria Prophylactic Drug ? Tafenoquine (TQ) (Formerly Next Generation Malaria Prophylaxis): Achieved Milestone C in FY 2019. Will continue the retinal (eye) safety study. Additional clinical sites were added. Address any FDA post-marketing approval requirements.  Rapid Diagnostic and Detection Devices (Infectious Disease Diagnostics (Multiple)): The dengue assay did not transition to PE 0604807A Project 849 in FY 2019 as expected. The dengue assay will transition in FY 2020. The chikungunya assays will continue to be developed and evaluated. Clinical testing will be conducted for chikungunya.			
<b>FY 2021 to FY 2022 Increase/Decrease Statement:</b>			

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603807A / <i>Medical Systems - Adv Dev</i>	<b>Project (Number/Name)</b> 808 / <i>DoD Drug &amp; Vacc Ad</i>

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
Decrease due to restructuring of R-Forms input			
<p><b>Title:</b> DoD Drug and Vaccine Advanced Development - Medical Readiness</p> <p><b>Description:</b> Funding is provided for the development of candidate medical countermeasures for military relevant infectious disease focusing on prevention to increase medical readiness. Funding supports both technical evaluations and human clinical testing to assure the safety and effectiveness of drugs, vaccines, medical diagnostic kits and devices</p> <p><b>FY 2022 Plans:</b> Staphylococcus aureus Vaccine: Prepare for transition of a vaccine candidate from industry and begin planning for a Phase 2 safety and efficacy trial of the candidate in an endemic population and an adult military/traveler population. We will conduct market research, develop CRADA's with industry partners and initiate acquisition documentation.</p> <p><b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> Increase due to restructuring of R-Forms input</p>	-	-	1.191
<p><b>Title:</b> DoD Drug and Vaccine Advanced Development - Battlefield Care and Return to Fight</p> <p><b>Description:</b> Funding is provided for the development of candidate medical countermeasures for military relevant infectious disease focusing on early diagnosis and accelerated recovery time. Funding supports both technical evaluations and human clinical testing to assure the safety and effectiveness of drugs, vaccines, medical diagnostic kits and devices</p> <p><b>FY 2022 Plans:</b> Rapid Diagnostic and Detection Devices (Infectious Disease Diagnostics (Multiple)): Conduct initial clinical efficacy trials and manufacturing development of the Tropical Disease and Flu and Viral Infection Diseases (FLU-VID) diagnostic panels for a man-portable device.</p> <p>Treatment for Drug Resistant Battlefield Wound Infections: Will monitor technical maturity of candidate treatments for evidence of safety and efficacy in relevant animal models.</p> <p><b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> Increase due to restructuring of R-Forms input</p>	-	-	5.286
<b>Accomplishments/Planned Programs Subtotals</b>	10.903	10.547	6.477

<b>C. Other Program Funding Summary (\$ in Millions)</b> N/A
<b>Remarks</b>



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**Exhibit R-2A, RDT&E Project Justification:** PB 2022 Army **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603807A / <i>Medical Systems - Adv Dev</i>	<b>Project (Number/Name)</b> 808 / <i>DoD Drug &amp; Vacc Ad</i>
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**D. Acquisition Strategy**

Test and evaluate in-house and commercially developed products in extensive commercial partner or government-managed clinical trials to gather data required for FDA licensure ensuring government (military) requirements are met with judicious investment.

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army** **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603807A / Medical Systems - Adv Dev	<b>Project (Number/Name)</b> 808 / DoD Drug & Vacc Ad
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<b>Management Services (\$ in Millions)</b>				<b>FY 2020</b>		<b>FY 2021</b>		<b>FY 2022 Base</b>		<b>FY 2022 OCO</b>		<b>FY 2022 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>			
Medical Product Development Management Services Cost	Various	Not Applicable : Not applicable	28.830	2.739		0.267		0.312		-		0.312	Continuing	Continuing	Continuing
Medical Product Development Management Services Cost	PO	General Dynamics Information Technology, : Frederick MD	7.718	0.749		0.666		0.605		-		0.605	0.000	9.738	-
<b>Subtotal</b>			36.548	3.488		0.933		0.917		-		0.917	Continuing	Continuing	N/A

<b>Product Development (\$ in Millions)</b>				<b>FY 2020</b>		<b>FY 2021</b>		<b>FY 2022 Base</b>		<b>FY 2022 OCO</b>		<b>FY 2022 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>			
Medical Product Development Cost	Various	Not applicable : Not applicable	33.686	0.849		-		-		-		-	Continuing	Continuing	Continuing
Rapid Diagnostic and Detection Devices	C/Various	Inbios, Inc : Seattle WA	1.997	6.434		2.748		-		-		-	0.000	11.179	-
Rapid Diagnostic and Detection Devices (MPDS)	Various	Cepheid : CA	-	-		-		2.092		-		2.092	0.000	2.092	-
Treatment for Resistant Infections - Antifungal Drug	Various	TBD : TBD	-	-		1.946		-		-		-	0.000	1.946	-
Next Generation Malaria Drug (D5P)	Various	TBD : TBD	-	-		2.627		-		-		-	0.000	2.627	-
Staphylococcus aureus Vaccine	Various	TBD : TBD	-	-		1.772		0.968		-		0.968	0.000	2.740	-
Treatment for Drug Resistant Battlefield Wound Infections (Formerly Treatment for Resistant Wound In	Various	TBD : TBD	-	-		-		2.500		-		2.500	0.000	2.500	-
<b>Subtotal</b>			35.683	7.283		9.093		5.560		-		5.560	Continuing	Continuing	N/A

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army** **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603807A / Medical Systems - Adv Dev	<b>Project (Number/Name)</b> 808 / DoD Drug & Vacc Ad
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<b>Support (\$ in Millions)</b>				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Medical Product Development Support Cost	Various	Not Applicable : Not applicable	16.146	0.132		-		-		-		-	Continuing	Continuing	Continuing
<b>Subtotal</b>			16.146	0.132		-		-		-		-	Continuing	Continuing	N/A

<b>Test and Evaluation (\$ in Millions)</b>				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Medical Product Development T&E Cost	Various	Not applicable : Not applicable	57.098	-		-		-		-		-	Continuing	Continuing	Continuing
Dengue Block II	IA	WRAIR and AFRIMS : Silver Spring MD	2.500	-		-		-		-		-	0.000	2.500	-
Malaria Prophylaxis Clinical Trial	TBD	TBD : TBD	11.123	-		0.521		-		-		-	0.000	11.644	-
<b>Subtotal</b>			70.721	-		0.521		-		-		-	Continuing	Continuing	N/A

	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
<b>Project Cost Totals</b>	159.098	10.903	10.547	6.477	-	6.477	Continuing	Continuing	N/A

Remarks

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**Exhibit R-4, RDT&E Schedule Profile: PB 2022 Army** **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603807A / <i>Medical Systems - Adv Dev</i>	<b>Project (Number/Name)</b> 808 / <i>DoD Drug &amp; Vacc Ad</i>
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Event Name	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Treatment for Resistant Wound Infections Antifungal Drug Phase 1	FY16-FY23																											
Rapid Human Diagnostic Devices	FY17-FY25																											
Staphylococcus aureus Vaccine	FY17-FY25																											

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**Exhibit R-4A, RDT&E Schedule Details:** PB 2022 Army **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603807A / <i>Medical Systems - Adv Dev</i>	<b>Project (Number/Name)</b> 808 / <i>DoD Drug &amp; Vacc Ad</i>
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Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Treatment for Resistant Wound Infections Antifungal Drug Phase 2 safety trial	1	2017	4	2023
Rapid Human Diagnostic Devices	4	2017	4	2025
Staphylococcus aureus Vaccine	4	2022	4	2024

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**Exhibit R-2A, RDT&E Project Justification:** PB 2022 Army **Date:** May 2021

Appropriation/Budget Activity 2040 / 4					R-1 Program Element (Number/Name) PE 0603807A / Medical Systems - Adv Dev				Project (Number/Name) 811 / Mil HIV Vac&Drug Dev			
COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
811: Mil HIV Vac&Drug Dev	-	5.236	4.912	-	-	-	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**Note**

For Fiscal Year (FY) 2022 the program funding has transitioned to Program Element (PE) 0604807A Project 849.

**A. Mission Description and Budget Item Justification**

This Project funds development of militarily relevant human immunodeficiency virus (HIV) medical countermeasures. It provides for the planning and conduct of human clinical trials in a group of healthy volunteers to assess for safety and tolerability of medical countermeasures, how the drug/vaccine is distributed through, metabolized in, and excreted from the body, and to investigate the appropriate dose. Development efforts are focused on militarily unique needs affecting manning, mobilization, and deployment. The cumulative cost of treating HIV-positive DoD personnel is estimated to be \$16.6 billion for 3000 personnel over a 50-year lifetime. All clinical trials are conducted in accordance with U.S. FDA regulations. Products from this Project will transition to PE 0604807A/Project 812.

Research efforts are coordinated with the National Institutes of Health and the National Institute of Allergy and Infectious Diseases (NIAID), Division of Acquired Immune Deficiency Syndrome (DAIDS).

**B. Accomplishments/Planned Programs (\$ in Millions)**

	FY 2020	FY 2021	FY 2022
<b>Title:</b> Military HIV Vaccine & Drug Development	5.236	4.912	-
<b>Description:</b> This Project funds advanced development research to develop candidate HIV vaccines, assess their safety and effectiveness in evaluations with human subjects, and protect military personnel from risks associated with HIV infection.			
<b>FY 2021 Plans:</b> Global Vaccine Candidate: Will continue to support clinical trial sites based on a Cooperative Research and Development Agreement (CRADA) with a commercial partner.			
<b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> For FY 2022 the program funding has transitioned to PE 0604807A Project 849.			
<b>Accomplishments/Planned Programs Subtotals</b>	5.236	4.912	-

**C. Other Program Funding Summary (\$ in Millions)**

N/A

**Remarks**

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**Exhibit R-2A, RDT&E Project Justification:** PB 2022 Army **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603807A / <i>Medical Systems - Adv Dev</i>	<b>Project (Number/Name)</b> 811 / <i>Mil HIV Vac&amp;Drug Dev</i>
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**D. Acquisition Strategy**

Test and evaluate commercially developed drug/vaccine candidates in government-managed trials.

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army** **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603807A / Medical Systems - Adv Dev	<b>Project (Number/Name)</b> 811 / Mil HIV Vac&Drug Dev
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<b>Management Services (\$ in Millions)</b>				<b>FY 2020</b>		<b>FY 2021</b>		<b>FY 2022 Base</b>		<b>FY 2022 OCO</b>		<b>FY 2022 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>			
Medical Product Development Management Services Cost	TBD	Not Applicable : Not Applicable	4.132	0.183		-		-		-		-	Continuing	Continuing	Continuing
<b>Subtotal</b>			4.132	0.183		-		-		-		-	Continuing	Continuing	N/A

**Remarks**  
Not Applicable

<b>Product Development (\$ in Millions)</b>				<b>FY 2020</b>		<b>FY 2021</b>		<b>FY 2022 Base</b>		<b>FY 2022 OCO</b>		<b>FY 2022 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>			
Medical Product Development Cost	TBD	Not applicable : Not applicable	5.078	-		-		-		-		-	Continuing	Continuing	Continuing
<b>Subtotal</b>			5.078	-		-		-		-		-	Continuing	Continuing	N/A

<b>Support (\$ in Millions)</b>				<b>FY 2020</b>		<b>FY 2021</b>		<b>FY 2022 Base</b>		<b>FY 2022 OCO</b>		<b>FY 2022 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>			
Medical Product Development Support Cost	TBD	TBD : TBD	4.541	-		-		-		-		-	0.000	4.541	-
<b>Subtotal</b>			4.541	-		-		-		-		-	0.000	4.541	N/A

**Remarks**  
Not Applicable

<b>Test and Evaluation (\$ in Millions)</b>				<b>FY 2020</b>		<b>FY 2021</b>		<b>FY 2022 Base</b>		<b>FY 2022 OCO</b>		<b>FY 2022 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>			
Medical Product Development T&E Cost	TBD	Not applicable : Not Applicable	28.204	5.053		3.748		-		-		-	0.000	37.005	-



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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army** **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603807A / Medical Systems - Adv Dev	<b>Project (Number/Name)</b> 811 / Mil HIV Vac&Drug Dev
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Test and Evaluation (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Medical Product Development T&E Cost	C/CPFF	PPD : Wilmington, NC	-	-		1.164		-		-		-	0.000	1.164	-
<b>Subtotal</b>			28.204	5.053		4.912		-		-		-	0.000	38.169	N/A

**Remarks**  
Not Applicable

	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
<b>Project Cost Totals</b>	41.955	5.236	4.912	-	-	-	Continuing	Continuing	N/A

**Remarks**

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**Exhibit R-4, RDT&E Schedule Profile: PB 2022 Army** **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603807A / <i>Medical Systems - Adv Dev</i>	<b>Project (Number/Name)</b> 811 / <i>Mil HIV Vac&amp;Drug Dev</i>
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Event Name	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Global HIV (Ad26/Ad26+gp140) Phase 2B Clinical Trial	FY18-FY21				FY20-FY24																							
Global HIV (Ad26/Ad26+gp140) Phase 3 Efficacy Clinical Trial	FY18-FY21				FY20-FY24																							

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**Exhibit R-4A, RDT&E Schedule Details:** PB 2022 Army **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603807A / <i>Medical Systems - Adv Dev</i>	<b>Project (Number/Name)</b> 811 / <i>Mil HIV Vac&amp;Drug Dev</i>
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Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Global HIV (Ad26/Ad26+gp140) Phase 2B Clinical Trial	1	2019	1	2022
Global HIV (Ad26/Ad26+gp140) Phase 3 Efficacy Clinical Trial	4	2020	1	2025

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army										<b>Date:</b> May 2021		
<b>Appropriation/Budget Activity</b> 2040 / 4					<b>R-1 Program Element (Number/Name)</b> PE 0603807A / Medical Systems - Adv Dev				<b>Project (Number/Name)</b> 836 / Field Medical Systems Advanced Development			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022 Base</b>	<b>FY 2022 OCO</b>	<b>FY 2022 Total</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>FY 2026</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
836: Field Medical Systems Advanced Development	-	13.587	17.335	15.594	-	15.594	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

This Project funds the demonstration and validation of medical products for enhanced combat casualty care and follow-on care, including rehabilitation. This Project funds human clinical trials to test the safety and effectiveness of biologics (products derived from living organisms) and devices necessary to meet medical requirements. When available, commercial-off-the-shelf (COTS) medical products are also tested and evaluated for transition to engineering and manufacturing development. Consideration is also given to reducing the medical logistics footprint through smaller weight, volume, and equipment independence from supporting materials. All clinical trials are conducted in accordance with U.S. FDA regulations. Products from this project will transition to PE 0604807A/Project 832.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
<p><b>Title:</b> Field Medical Systems Advanced Development - Program Management (PM) Warfighter Expeditionary Medicine and Treatment</p> <p><b>Description:</b> Funding is provided for the development of the following medical devices in support of enhanced combat casualty care.</p> <p><b>FY 2021 Plans:</b>                      Temporary Corneal Repair: Will conduct initial clinical trials in humans to assess safety.                      Extracorporeal Life Support - Lung/Renal: Continue pre-clinical and/or clinical studies for the lung and renal components required by the Food and Drug Administration.                      Non-invasive neuro assessment device (NINAD): Moved to WBH due to PMO Reorganization.                      Extremity Injury Repair ? Vascular: Will continue ongoing clinical trials for military relevant applications. Will continue ongoing manufacturing contract.</p> <p><b>FY 2021 to FY 2022 Increase/Decrease Statement:</b>                      Program efforts realigned to Field Medical Systems Advanced in FY22.</p>	3.178	10.782	-
<p><b>Title:</b> Field Medical Systems Advanced Development - PM Warfighter Health, Performance and Evacuation</p> <p><b>Description:</b> Funding is provided for the following efforts in the development of products that support the medical mission in combat casualty care and health care operations.</p> <p><b>FY 2021 Plans:</b></p>	5.259	1.053	-

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army		<b>Date:</b> May 2021		
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603807A / <i>Medical Systems - Adv Dev</i>	<b>Project (Number/Name)</b> 836 / <i>Field Medical Systems Advanced Development</i>		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
<p>Nett Warrior Enhanced Physiological Sensors (Wearable): Consolidated with, and funded under, Concussion Dosimetry for mTBI Assessment below.</p> <p>Concussion Dosimetry for mTBI Assessment: Prepare sensor and algorithms for validation, verification and operational evaluation or transition to PE 654807 (0604807A)/832.</p> <p>Transport Telemedicine Systems (TTS) (Formerly named Operational Virtual Health): Initiate and complete MEDHUB Increment 1 airworthiness, cyber security and other certifications. Continue development of MEDHUB Increment 2 Drug Safety and Tracking system.</p> <p>Next Generation Uniform Repellent/Impregnation: Project was completed and transitioned to PEO Soldier in FY 2020.</p> <p><b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> Program efforts realigned to Field Medical Systems Advanced in FY22.</p>				
<p><b>Title:</b> Field Medical Systems Advanced Development - PM Tissue Injury and Regenerative Medicine</p> <p><b>Description:</b> Funding for engineering and manufacturing development of tissue injury and regenerative medicine health products for enhanced medical capability and readiness</p>		5.150	-	-
<p><b>Title:</b> Field Medical Systems Advanced Development - Medical Readiness</p> <p><b>Description:</b> Funding is provided for engineering and manufacturing development of medical products for diagnostic devices and testing of medical devices for use in the field.</p> <p><b>FY 2022 Plans:</b> Non-invasive Neuro Assessment Devices (NINAD): Will complete an analysis of alternatives report. Will award R&amp;D contract for development of NINAD capability. Will initiate bench performance testing to demonstrate adequate performance in the laboratory. Will begin protocol development and infrastructure preparation for field evaluation / clinical trial(s) to demonstrate effectiveness in a defined Traumatic Brain Injury population to enable U.S. FDA approval. XXXXXX</p> <p><b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> Increase due to restructuring of R-Forms input</p>		-	-	4.203
<p><b>Title:</b> Field Medical Systems Advanced Development - Battlefield Care and Return to Fight</p> <p><b>Description:</b> Funding is provided for the development of the medical devices in support of enhanced combat casualty care.</p>		-	-	6.014

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603807A / Medical Systems - Adv Dev	<b>Project (Number/Name)</b> 836 / Field Medical Systems Advanced Development

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
<p><b>FY 2022 Plans:</b>                      Temporary Corneal Repair: Will continue initial clinical trials and conduct activities to support FDA clearance of TCR product. Will perform developmental and military-relevant testing of product candidates.                      Extracorporeal Life Support - Lung/Renal: Closing out current contract activities in FY21. Candidate returned to technology base for refinement to meet MDO CONOPS.                      Burn Treatment Skin Repair- Burn Conversion Prevention: Will award prototyping agreements for products needed to treat severe burns in prolonged care scenarios                      Freeze Dried Platelets: Conduct market research, develop CRADA's with industry partners and initiate acquisition documentation for a candidate from industry and begin planning for a Phase 2 safety and efficacy trial of the candidate.</p> <p><b>FY 2021 to FY 2022 Increase/Decrease Statement:</b>                      Increase due to restructuring of R-Forms input</p>			
<p><b>Title:</b> Field Medical Systems Advanced Development - Field Hospital and Evacuation</p> <p><b>Description:</b> Funding is provided for the development of the medical devices in support of support the medical mission in health care operations and evacuation.</p> <p><b>FY 2022 Plans:</b>                      Transport Telemedicine Systems (TTS): Will start TTS MEDHUB (Medical Hands-Free Unified Broadcast) Increment 2, which will focus on FDA approval and development (ruggedization for a high vibration environment, etc) of peripheral medical devices that will communicate with MEDHUB. The peripheral medical devices include Drug Safety and Tracking System, Intravenous Pressure Infuser and Blood Pressure Monitor.</p> <p><b>FY 2021 to FY 2022 Increase/Decrease Statement:</b>                      Increase due to restructuring of R-Forms input</p>	-	-	5.377
<b>Accomplishments/Planned Programs Subtotals</b>	13.587	11.835	15.594

	<b>FY 2020</b>	<b>FY 2021</b>
<b>Congressional Add:</b> Program increase - composite shelter	-	5.500
<b>FY 2021 Plans:</b> Develop and test advanced fully composite shelters to improve Hospital Center operations.		
<b>Congressional Adds Subtotals</b>	-	5.500

<b>C. Other Program Funding Summary (\$ in Millions)</b> N/A
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Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603807A / Medical Systems - Adv Dev	Project (Number/Name) 836 / Field Medical Systems Advanced Development

**C. Other Program Funding Summary (\$ in Millions)**

**Remarks**

**D. Acquisition Strategy**

Develop in-house or industrial prototypes in government-managed programs to meet military and regulatory requirements for production and fielding.

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army** **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603807A / Medical Systems - Adv Dev	<b>Project (Number/Name)</b> 836 / Field Medical Systems Advanced Development
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<b>Management Services (\$ in Millions)</b>				<b>FY 2020</b>		<b>FY 2021</b>		<b>FY 2022 Base</b>		<b>FY 2022 OCO</b>		<b>FY 2022 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>			
Medical Product Development Management Services Cost	Various	Not Applicable : Not applicable	47.729	0.581		0.604		1.582		-		1.582	Continuing	Continuing	Continuing
Medical Product Development Management Services Cost	C/IDIQ	Not applicable : Not applicable	2.295	-		-		0.150		-		0.150	0.000	2.445	-
<b>Subtotal</b>			50.024	0.581		0.604		1.732		-		1.732	Continuing	Continuing	N/A

<b>Product Development (\$ in Millions)</b>				<b>FY 2020</b>		<b>FY 2021</b>		<b>FY 2022 Base</b>		<b>FY 2022 OCO</b>		<b>FY 2022 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>			
Temporary Corneal Repair	C/Various	Ashvattha Therapeutics, LLC , University of Southern California, Institute of Surgical Research : Redwood City, CA, Los Angeles, CA, San Antonio, TX	6.835	2.424		4.462		2.178		-		2.178	0.000	15.899	-
Extracorporeal Life Support (ECLS)	Various	Medical Technology Enterprise Consortium : Summerville SC	-	0.558		3.150		-		-		-	0.000	3.708	-
Non-invasive neuro assessment device (NINAD)	C/Various	TBD : TBD	0.800	-		-		1.471		-		1.471	0.000	2.271	-
Transport Telemedicine Systems (TTS) - MEDHUB Platform	TBD	TBD : TBD	0.350	1.936		-		2.899		-		2.899	Continuing	Continuing	Continuing
Extremity Injury Repair - Vascular	TBD	SS/CPFF : HumaCyte: Morrisville, NC	1.778	4.832		2.531		-		-		-	Continuing	Continuing	Continuing



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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army** **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603807A / Medical Systems - Adv Dev	<b>Project (Number/Name)</b> 836 / Field Medical Systems Advanced Development
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<b>Product Development (\$ in Millions)</b>				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Nett Warrior Enhanced Physiological Sensors (Wearable)	TBD	Various : Various	-	0.820		-		-		-		-	Continuing	Continuing	Continuing
Burn Treatment Skin Repair	TBD	TBD : TBD	-	-		-		3.265		-		3.265	0.000	3.265	-
Freeze Dried Platelets	TBD	TBD : TBD	-	-		-		0.316		-		0.316	0.000	0.316	-
<b>Subtotal</b>			9.763	10.570		10.143		10.129		-		10.129	Continuing	Continuing	N/A

<b>Support (\$ in Millions)</b>				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Medical Product Development Support Cost	Various	Not Applicable : Not applicable	49.441	1.758		1.088		1.842		-		1.842	Continuing	Continuing	Continuing
Program increase - composite shelter	TBD	TBD : TBD	-	-		5.500		-		-		-	0.000	5.500	-
<b>Subtotal</b>			49.441	1.758		6.588		1.842		-		1.842	Continuing	Continuing	N/A

**Remarks**  
No product/contract costs greater than \$1M individually.

<b>Test and Evaluation (\$ in Millions)</b>				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Medical Product Development T&E Cost	TBD	Not applicable : Not applicable	39.276	0.678		-		-		-		-	Continuing	Continuing	Continuing
Noninvasive Neuro-Assessment Devices (NINAD)	TBD	TBD : TBD	-	-		-		1.891		-		1.891	0.000	1.891	-
<b>Subtotal</b>			39.276	0.678		-		1.891		-		1.891	Continuing	Continuing	N/A

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army** **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603807A / Medical Systems - Adv Dev	<b>Project (Number/Name)</b> 836 / Field Medical Systems Advanced Development
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Test and Evaluation (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total		Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete			

**Remarks**  
No product/contract costs greater than \$1M individually.

	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
<b>Project Cost Totals</b>	148.504	13.587	17.335	15.594	-	15.594	Continuing	Continuing	N/A

**Remarks**

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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2022 Army</b>		<b>Date: May 2021</b>
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603807A / Medical Systems - Adv Dev	<b>Project (Number/Name)</b> 836 / Field Medical Systems Advanced Development

Event Name	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026												
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4									
Temporary Corneal Repair	R&D development																																				
Temporary Corneal Repair -Prototype Testing	Prototype Testing																																				
Temporary Corneal Repair- Clinical Study																																					
Noninvasive Neuro Assessment Device development (NINAD)	R&D development																																				
Transport Telemedicine Systems (TTS)- MEDHUB Platform	R&D development																																				
Transport Telemedicine Systems (TTS)- MEDHUB Drug Safety and	R&D development																																				
Extremity Injury Repair (Per. Acellular Arterial Graft) - Vascular P	R&D development																																				
Extremity Injury Repair - Vascular- Environmental Testing/Operational Testing	Environmental Testing/Operational Testing																																				
Burn Treatment Skin Repair																																					
Freeze Dried Platelets																																					

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603807A / <i>Medical Systems - Adv Dev</i>	<b>Project (Number/Name)</b> 836 / <i>Field Medical Systems Advanced Development</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Temporary Corneal Repair	2	2016	1	2024
Temporary Corneal Repair -Prototype Testing	2	2018	1	2024
Temporary Corneal Repair- Clinical Study	2	2021	4	2023
Noninvasive Neuro Assessment Device development (NINAD)	1	2019	1	2025
Transport Telemedicine Systems (TTS)- MEDHUB Platform	3	2013	1	2022
Transport Telemedicine Systems (TTS)- MEDHUB Drug Safety and Tracking	1	2018	3	2024
Extremity Injury Repair (Per. Acellular Arterial Graft) - Vascular Pivotal Study	1	2020	1	2022
Extremity Injury Repair - Vascular- Environmental Testing/Operational Testing	1	2021	1	2022
Burn Treatment Skin Repair	1	2023	1	2025
Freeze Dried Platelets	3	2022	3	2025

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**Exhibit R-2A, RDT&E Project Justification:** PB 2022 Army **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603807A / Medical Systems - Adv Dev	<b>Project (Number/Name)</b> FF4 / Counterdrug, DDR, Sys Development & Demonstration
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
FF4: Counterdrug, DDR, Sys Development & Demonstration	-	0.500	-	-	-	-	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

**A. Mission Description and Budget Item Justification**

Supports the Secretary of Defense approved counterdrug advanced development efforts used in a major re-design of the Forensic Toxicology Drug Testing Laboratory (FTDTL) information management system used to test urine samples for the presence of illegal drugs. The Drug Testing Program - Client Collection System (DTP-CSS) is comprised of several variations of a desktop application used to select service members for random drug testing, prepare labels for urine specimen bottles, and print corresponding chain-of-custody documents. This Project will standardize DTP-CSS across all services and migrate it to a Web-based system.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	FY 2020	FY 2021	FY 2022
<b>Title:</b> FF4	0.500	-	-
<b>Accomplishments/Planned Programs Subtotals</b>	0.500	-	-

**C. Other Program Funding Summary (\$ in Millions)**

N/A

**Remarks**

**D. Acquisition Strategy**

N/A

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army** **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603807A / Medical Systems - Adv Dev	<b>Project (Number/Name)</b> FF4 / Counterdrug, DDR, Sys Development & Demonstration
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<b>Product Development (\$ in Millions)</b>				<b>FY 2020</b>		<b>FY 2021</b>		<b>FY 2022 Base</b>		<b>FY 2022 OCO</b>		<b>FY 2022 Total</b>		<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>				
Product Development	C/UCA	Alliant Corps LLC : San Antonio, TX	14.696	0.500		-		-		-		-	0.000	15.196	-	
<b>Subtotal</b>			14.696	0.500		-		-		-		-	0.000	15.196	N/A	

<b>Prior Years</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022 Base</b>		<b>FY 2022 OCO</b>		<b>FY 2022 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>			
<b>Project Cost Totals</b>		14.696	0.500		0.000		-		-	-	0.000	15.196	N/A

**Remarks**

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<b>Exhibit R-4, RDT&amp;E Schedule Profile:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603807A / Medical Systems - Adv Dev	<b>Project (Number/Name)</b> FF4 / Counterdrug, DDR, Sys Development & Demonstration

	FY 2013				FY 2014				FY 2015				FY 2016				FY 2017				FY 2018				FY 2019			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Determine Hosting requirements																												
Coding and Development Testing																												
User Testing																												

	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Determine Hosting requirements																												
Coding and Development Testing																												
User Testing																												

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603807A / <i>Medical Systems - Adv Dev</i>	<b>Project (Number/Name)</b> FF4 / <i>Counterdrug, DDR, Sys Development &amp; Demonstration</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Determine Hosting requirements	2	2017	2	2017
Coding and Development Testing	3	2017	1	2019
User Testing	1	2019	2	2019



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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army										<b>Date:</b> May 2021		
<b>Appropriation/Budget Activity</b> 2040 / 4					<b>R-1 Program Element (Number/Name)</b> PE 0603807A / Medical Systems - Adv Dev				<b>Project (Number/Name)</b> VS7 / MEDEVAC Mission Equipment Package (MEP) - Adv Dev			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022 Base</b>	<b>FY 2022 OCO</b>	<b>FY 2022 Total</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>FY 2026</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
VS7: MEDEVAC Mission Equipment Package (MEP) - Adv Dev	-	6.081	0.291	-	-	-	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**Note**

Other Army requirements will take precedence and this effort will terminate.

**A. Mission Description and Budget Item Justification**

This Project is funded to achieve the required operational capability and common capability across the MEDEVAC fleet. The MEDEVAC MEP program modernizes and retrofits MEDEVAC legacy helicopters to achieve the medical capability provided by a limited number of mission specific MEDEVAC helicopters, to include Blackhawk and Future Vertical Lift. The Medevac Mission Equipment on the Army MEDEVAC helicopters is critical to maintaining high US troop survival rates during current and future conflicts by evacuating wounded troops quickly while providing good care enroute. To better meet operational needs, in 2009 the Vice Chief of Staff of the Army (VCSA) approved the force design update increasing the number of air frames for MEDEVAC companies. In 2010, the Army Medical Department (US Army) accepted life-cycle management of the MEDEVAC MEP from PEO Aviation. Ongoing research and design efforts are required to prepare and optimize the MEDEVAC fleet with mission equipment. All products from this Project will transition to PE 0604807A/Project VS8.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
<b>Title:</b> Medical Evacuation Development	0.281	0.291	-
<b>Description:</b> This effort involves Aeromedical Evacuation Cabin and Technology Research to determine the optimum space and configuration for performing necessary life-saving paramedic-level tasks. Efforts will develop patient handling system components and prototypes to ensure paramedic skills and tasks are performed to standard to save Soldiers' lives during point of injury MEDEVAC Missions.			
<b>FY 2021 Plans:</b> Future Vertical Lift (FVL) Aeromedical Evacuation Patient Handling System Design: Continue to develop and design patient handling system for Future Vertical Lift so medics can effectively treat patients during MEDEVAC Missions.			
<b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> Other Army requirements will take precedence and this effort will terminate			
<b>Accomplishments/Planned Programs Subtotals</b>	0.281	0.291	-

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army	<b>Date:</b> May 2021
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<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603807A / <i>Medical Systems - Adv Dev</i>	<b>Project (Number/Name)</b> VS7 / <i>MEDEVAC Mission Equipment Package (MEP) - Adv Dev</i>
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	FY 2020	FY 2021
<b>Congressional Add:</b> Transport Telemedicine	5.800	-
<b>FY 2020 Accomplishments:</b> Transport Telemedicine		
<b>Congressional Adds Subtotals</b>	5.800	-

**C. Other Program Funding Summary (\$ in Millions)**

N/A

**Remarks**

**D. Acquisition Strategy**

Develop in-house or industrial prototypes in government-managed programs to meet military MEDEVAC and regulatory requirements for production and fielding.

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army** **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603807A / Medical Systems - Adv Dev	<b>Project (Number/Name)</b> VS7 / MEDEVAC Mission Equipment Package (MEP) - Adv Dev
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<b>Management Services (\$ in Millions)</b>				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Medical Product Development Services Cost	Various	APM MEDEVAC PEO Aviation : Huntsville, AL	0.611	3.054		0.291		-		-		-	0.000	3.956	-
<b>Subtotal</b>			0.611	3.054		0.291		-		-		-	0.000	3.956	N/A

<b>Product Development (\$ in Millions)</b>				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Medical Product Development Cost	TBD	APM MEDEVAC PEO Aviation : Huntsville AL	1.624	3.027		-		-		-		-	0.000	4.651	-
<b>Subtotal</b>			1.624	3.027		-		-		-		-	0.000	4.651	N/A

<b>Support (\$ in Millions)</b>				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Medical Product Development Support Cost	TBD	APM MEDEVAC PEO Aviation : Huntsville, AL	0.911	-		-		-		-		-	0.000	0.911	-
<b>Subtotal</b>			0.911	-		-		-		-		-	0.000	0.911	N/A

<b>Test and Evaluation (\$ in Millions)</b>				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Medical Product Development T&E Cost	MIPR	APM MEDEVAC PEO Aviation : Huntsville, AL	0.199	-		-		-		-		-	0.000	0.199	-
<b>Subtotal</b>			0.199	-		-		-		-		-	0.000	0.199	N/A

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<b>Exhibit R-3, RDT&amp;E Project Cost Analysis: PB 2022 Army</b>										<b>Date: May 2021</b>			
<b>Appropriation/Budget Activity</b> 2040 / 4				<b>R-1 Program Element (Number/Name)</b> PE 0603807A / <i>Medical Systems - Adv Dev</i>				<b>Project (Number/Name)</b> VS7 / <i>MEDEVAC Mission Equipment Package (MEP) - Adv Dev</i>					
	<b>Prior Years</b>	<b>FY 2020</b>		<b>FY 2021</b>		<b>FY 2022 Base</b>		<b>FY 2022 OCO</b>		<b>FY 2022 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Project Cost Totals</b>	3.345	6.081		0.291		-		-		-	0.000	9.717	N/A

**Remarks**

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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2022 Army</b>			<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603807A / <i>Medical Systems - Adv Dev</i>	<b>Project (Number/Name)</b> VS7 / <i>MEDEVAC Mission Equipment Package (MEP) - Adv Dev</i>	

Event Name	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Future Vertical Lift (FVL) and UH60 Aeromedical Evac Cabin Sp	Research and development																											

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603807A / <i>Medical Systems - Adv Dev</i>	<b>Project (Number/Name)</b> VS7 / <i>MEDEVAC Mission Equipment Package (MEP) - Adv Dev</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Future Vertical Lift (FVL) and UH60 Aeromedical Evac Cabin Space and Technology	1	2017	4	2021

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**Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Army** **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040: Research, Development, Test & Evaluation, Army / BA 4: Advanced Component Development & Prototypes (ACD&P)	<b>R-1 Program Element (Number/Name)</b> PE 0603827A / Soldier Systems - Advanced Development
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	-	25.204	23.184	17.459	-	17.459	-	-	-	-	-	-
CF2: <i>Integrated Soldier Systems Prototyping (SL CFT)</i>	-	1.878	2.449	3.111	-	3.111	-	-	-	-	-	-
ET8: <i>Personnel Airdrop System Development</i>	-	0.285	1.219	1.155	-	1.155	-	-	-	-	-	-
S53: <i>Clothing And Equipment</i>	-	6.365	1.742	2.004	-	2.004	-	-	-	-	-	-
S54: <i>Small Arms Improvement</i>	-	13.956	15.495	6.911	-	6.911	-	-	-	-	-	-
VS4: <i>Soldier Protective Equipment</i>	-	2.720	2.279	4.278	-	4.278	-	-	-	-	-	-

**A. Mission Description and Budget Item Justification**

This Program Element (PE), Advanced Component Development and Prototypes, manages the Soldier as a system to increase combat effectiveness, test and deliver tangible products that save Soldiers lives and improve combat capability. The PE provides funding for evaluating, developing, and testing emerging technologies and critical Soldier support systems to reduce technology risk.

**CF2**

The Integrated Squad effort includes the completion of the Adaptive Squad Architecture (ASA), Squad Performance Metrics (SPM) and the Soldier Integration Facility (SIF) programs. These efforts are Program Executive Office-Soldier (PEO-S) led and will develop a full system architecture for the Soldier and the Squad paired with a constructive and live integration capability with the SIF. This will be accomplished by developing Interface Control Documents (ICDs) in order to provide common established interfaces for internal and external stakeholders who will interface on or with the Soldier/Squad platforms. The critical elements are the development of the "Soldiers as Integrated Weapons Systems" and "Squad as an Integrated Combat Platform" vision based on threat, operational environment and collaboration with internal and external stakeholders to inform investment decisions out to Fiscal Year (FY) 2050. The ASA/SPM/SIF will develop a metric-based approach that will include virtual, constructive and live evaluations and tools across the Department of Defense (DoD), academia and industry which will be used for senior leaders to make deliberate decisions based on the analysis of Soldier/Squad performance.

**ET8**

Personnel Airdrop System improves Low Altitude and High Altitude personnel parachutes and associated equipment to include canopy improvement based on integration of new technology with the goal of enhancing the insertion capability and safety of the airborne Soldier and increasing the performance, reliability, and durability of personnel airdrop equipment.

**S53**

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2022 Army	<b>Date:</b> May 2021
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<b>Appropriation/Budget Activity</b> 2040: <i>Research, Development, Test &amp; Evaluation, Army / BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0603827A / <i>Soldier Systems - Advanced Development</i>
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This Project evaluates and integrates technologies and representative or prototype systems that help expedite Soldier Clothing and Individual Equipment technology transition from the laboratory to operational use. Efforts focus on proving out commonality across as broad a spectrum of users as possible to provide a modular, integrated uniform/clothing system from skin out and head-to-toe. It funds efforts to transition new technologies and domestically available fabrics with Flame Resistant (FR), moisture wicking, insect protection and camouflage technologies, including integration of fabrics appropriate for uniforms and equipment used in jungle/tropical and arctic environments. New technologies are identified to monitor health and improve Soldier survivability, reduce weight, and improve affordability, mobility and comfort in combat and training/administrative environments. Includes integration and interface on the Soldier system.

**S54**

The Small Arms Improvement Advanced Component Development and Prototypes (ACD&P) program provides funds to mature, demonstrate, test and evaluate emerging technology from Budget Activity (BA) 3 Program Element 0603607A Joint Service Small Arms Program (JSSAP) Project 627 Defense Advanced Research Projects Agency (DARPA), Department of Energy National Laboratories, Research Development & Engineering Centers (RDECs) and other domestic and foreign sources for small arms weapon systems and technology. Small arm weapon systems include weapons ranging up to 40 millimeter in caliber. Current and future efforts focus on improvements designed to enhance lethality, target acquisition and tracking, fire control, usability, training effectiveness and reliability of weapons to include ammunition when developing and/or evaluating standard and non-standard weapons. Focus areas include the maturing of technology through testing and evaluation of sub-system or system prototypes which demonstrates light weight materials, wear resistant/protective/anti-reflective coatings, observation/situational awareness improvements, human-systems integration, robotic armament capability, non-lethal capability, and equipment enhancements. Benefits include continuous improvements to small arms weapon systems, fire control equipment, optics, gun barrels, training devices, suppressors, component mounts, weapon mounts, and weapon/ammunition interface. Includes costs associated with efforts for integration and interface of products on Soldiers' head, body and weapons.

**VS4**

This Project supports efforts to evaluate integrated technologies and representative or prototype systems that help expedite Personal Protective Equipment (PPE) technology transition from the laboratory to operational use.

<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022 Base</b>	<b>FY 2022 OCO</b>	<b>FY 2022 Total</b>
Previous President's Budget	26.113	26.138	30.945	-	30.945
Current President's Budget	25.204	23.184	17.459	-	17.459
Total Adjustments	-0.909	-2.954	-13.486	-	-13.486
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-2.000			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.909	-0.954			
• Adjustments to Budget Years	-	-	-13.486	-	-13.486



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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2022 Army	<b>Date:</b> May 2021
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<b>Appropriation/Budget Activity</b> 2040: <i>Research, Development, Test &amp; Evaluation, Army / BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0603827A / <i>Soldier Systems - Advanced Development</i>
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**Congressional Add Details (\$ in Millions, and Includes General Reductions)**

**Project:** S53: *Clothing And Equipment*

Congressional Add: *Cold Weather Clothing*

Congressional Add Subtotals for Project: S53

Congressional Add Totals for all Projects

	FY 2020	FY 2021
	4.000	-
	4.000	-
	4.000	-

**Change Summary Explanation**

The decrease from PB21 to PB22 for FY 2022 is due to progression of technology into 6.5 RDTE.

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army										<b>Date:</b> May 2021		
<b>Appropriation/Budget Activity</b> 2040 / 4					<b>R-1 Program Element (Number/Name)</b> PE 0603827A / <i>Soldier Systems - Advanced Development</i>				<b>Project (Number/Name)</b> CF2 / <i>Integrated Soldier Systems Prototyping (SL CFT)</i>			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022 Base</b>	<b>FY 2022 OCO</b>	<b>FY 2022 Total</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>FY 2026</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
CF2: <i>Integrated Soldier Systems Prototyping (SL CFT)</i>	-	1.878	2.449	3.111	-	3.111	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

Verify and maintain tools that provide Systems Engineering, Configuration Management, and Evaluations in a virtual and physical environment. Verify and maintain the Adaptive Squad Architecture (ASA) and Squad Performance Metrics (SPM) with emphasis on development of Interface Control Documents (ICDs), specifically to support the rapid integration of the Soldier Lethality Cross Functional Team (SL CFT) priority programs with all other dismounted Soldier equipment. Prototype capabilities for evaluation and integration. Execute evaluation of new measurements and methodologies from the S&T community, execute system level evaluation environments, and support Soldier system modeling. Funding for this project aligns with the Army's priorities in support of the National Defense Strategy and is a priority of the Soldier Lethality Cross Functional Team.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
<b>Title:</b> Integrated Soldier Systems Prototyping	1.878	2.449	3.111
<b>Description:</b> Verify and maintain tools that provide Systems Engineering, Configuration Management, and Evaluations in a virtual and physical environment. Verify and maintain the ASA and SPM with emphasis on development of ICDs, specifically to support the rapid integration of the Soldier Lethality Cross Functional Team (SL CFT) priority programs with all other equipment the dismounted Soldier will use. Provide prototyping of capabilities for evaluation and integration. Execute evaluation of new measurements and methodologies from the S&T community, execute system level evaluation environments, and support Soldier system modeling. Funding for this project aligns with the Army's priorities in support of the National Defense Strategy and is a priority of the Soldier Lethality Cross Functional Team.			
<b>FY 2021 Plans:</b> Accelerate the development of components, algorithms, and demonstrations in support of Squad as an Integrated Combat Platform			
<b>FY 2022 Plans:</b> Continue to develop components, algorithms, and demonstrations in support of Squad as an Integrated Combat Platform.			
<b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> Funding increase continue to support the development of the Adaptive Squad Architecture, Squad Performance Metrics and the Soldier Integration Facility.			
<b>Accomplishments/Planned Programs Subtotals</b>	1.878	2.449	3.111

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603827A / <i>Soldier Systems - Advanced Development</i>	<b>Project (Number/Name)</b> CF2 / <i>Integrated Soldier Systems Prototyping (SL CFT)</i>

**C. Other Program Funding Summary (\$ in Millions)**

<u>Line Item</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022</u> <u>Base</u>	<u>FY 2022</u> <u>OCO</u>	<u>FY 2022</u> <u>Total</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>FY 2026</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• CF3: <i>Integrated Soldier Systems (SL CFT)</i>	6.818	4.429	4.371	-	4.371	-	-	-	-	-	-

**Remarks**

**D. Acquisition Strategy**

Develop and validate the verification and operation of the ASA tools (Configuration Database (CD), Architectural Assessment Tool (AAT), Squad Performance Metrics (SPM)) under full and open competition. Attempt to utilize one vendor for, at a minimum, maintenance of the CD and AAT. Conduct evaluations to support the SPM, with the Government acting as the lead developer.

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<b>Exhibit R-3, RDT&amp;E Project Cost Analysis: PB 2022 Army</b>												<b>Date: May 2021</b>			
<b>Appropriation/Budget Activity</b> 2040 / 4				<b>R-1 Program Element (Number/Name)</b> PE 0603827A / <i>Soldier Systems - Advanced Development</i>				<b>Project (Number/Name)</b> CF2 / <i>Integrated Soldier Systems Prototyping (SL CFT)</i>							
<b>Management Services (\$ in Millions)</b>				<b>FY 2020</b>		<b>FY 2021</b>		<b>FY 2022 Base</b>		<b>FY 2022 OCO</b>		<b>FY 2022 Total</b>			
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
FY 2022 SBIR/STTR Transfer	TBD	Various : Various	-	-		-		0.156		-		0.156	0.000	0.156	-
<b>Subtotal</b>			-	-		-		0.156		-		0.156	0.000	0.156	N/A
<b>Product Development (\$ in Millions)</b>				<b>FY 2020</b>		<b>FY 2021</b>		<b>FY 2022 Base</b>		<b>FY 2022 OCO</b>		<b>FY 2022 Total</b>			
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
Adaptive Squad Architecture (ASA) Squad Performance Metrics (SPM)	C/FFP	TBD : TBD	-	0.374	Jan 2020	0.931	Jan 2021	0.607	Jan 2022	-		0.607	Continuing	Continuing	Continuing
<b>Subtotal</b>			-	0.374		0.931		0.607		-		0.607	Continuing	Continuing	N/A
<b>Test and Evaluation (\$ in Millions)</b>				<b>FY 2020</b>		<b>FY 2021</b>		<b>FY 2022 Base</b>		<b>FY 2022 OCO</b>		<b>FY 2022 Total</b>			
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
ASA/SPM Test & Eval	C/FFP	TBD : TBD	-	1.504		1.518	Dec 2020	2.348	Dec 2021	-		2.348	Continuing	Continuing	Continuing
<b>Subtotal</b>			-	1.504		1.518		2.348		-		2.348	Continuing	Continuing	N/A
<b>Project Cost Totals</b>			-	1.878		2.449		3.111		-		3.111	Continuing	Continuing	N/A
<b>Remarks</b>															

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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2022 Army</b>			<b>Date: May 2021</b>		
<b>Appropriation/Budget Activity</b> 2040 / 4		<b>R-1 Program Element (Number/Name)</b> PE 0603827A / <i>Soldier Systems - Advanced Development</i>		<b>Project (Number/Name)</b> CF2 / <i>Integrated Soldier Systems Prototyping (SL CFT)</i>	

Event Name	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
ASA SPM Implementation																												

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603827A / <i>Soldier Systems - Advanced Development</i>	<b>Project (Number/Name)</b> CF2 / <i>Integrated Soldier Systems Prototyping (SL CFT)</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
ASA SPM Implementation	2	2020	4	2026

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**Exhibit R-2A, RDT&E Project Justification:** PB 2022 Army **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4					<b>R-1 Program Element (Number/Name)</b> PE 0603827A / <i>Soldier Systems - Advanced Development</i>				<b>Project (Number/Name)</b> ET8 / <i>Personnel Airdrop System Development</i>			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022 Base</b>	<b>FY 2022 OCO</b>	<b>FY 2022 Total</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>FY 2026</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
ET8: <i>Personnel Airdrop System Development</i>	-	0.285	1.219	1.155	-	1.155	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

Funding in this project supports the Army's Cross Functional Teams (CFT) initiatives. Project ET8, Personnel Airdrop System Development, improves Low Altitude and High Altitude personnel parachutes and associated equipment to include canopy improvement based on integration of new technology with the goal of enhancing the insertion capability and safety of the airborne Soldier and increasing the performance, reliability, and durability of personnel airdrop equipment. This project will transition capabilities from our Science and Technology partners to increase performance and safety of Soldier clothing and equipment. It will continue to support cross-service initiatives to improve commonality.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
<b>Title:</b> Personnel Airdrop System Development	0.285	1.219	1.155
<b>Description:</b> Improve Low Altitude and High Altitude personnel parachutes and associated equipment to include canopy improvements based on integration of new technology with the goal of enhancing the insertion and safety of the airborne soldier and increasing the performance, reliability, and durability of personnel airdrop equipment.			
<b>FY 2021 Plans:</b> Continue development and begin evaluation of Low Altitude Static Line Reserve Parachute Automatic Activation Devices.			
<b>FY 2022 Plans:</b> Continue evaluation of Low Altitude Static Line Reserve Parachute Automatic Activation Devices. Begin development and evaluation of Smart Universal Static Line Snap Hook (SUSH).			
<b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> Funding decrease nominal. No change in plans.			
<b>Accomplishments/Planned Programs Subtotals</b>	0.285	1.219	1.155

**C. Other Program Funding Summary (\$ in Millions)**

<b>Line Item</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022 Base</b>	<b>FY 2022 OCO</b>	<b>FY 2022 Total</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>FY 2026</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
• ES9: <i>Advanced Tactical Parachute System</i>	6.345	1.761	2.705	-	2.705	-	-	-	-	-	-

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army	<b>Date:</b> May 2021
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<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603827A / <i>Soldier Systems - Advanced Development</i>	<b>Project (Number/Name)</b> ET8 / <i>Personnel Airdrop System Development</i>
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**C. Other Program Funding Summary (\$ in Millions)**

<u>Line Item</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022</u> <u>Base</u>	<u>FY 2022</u> <u>OCO</u>	<u>FY 2022</u> <u>Total</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>FY 2026</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• MA7801: <i>Advanced Tactical Parachute System</i>	42.622	53.021	38.159	-	38.159	-	-	-	-	-	-

**Remarks**

**D. Acquisition Strategy**

Programs pursue technology maturation and prototype development, culminating in the transition of mature technologies (Technology Readiness Level (TRL) 6-7) to system development and demonstration (SDD).



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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army** **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603827A / <i>Soldier Systems - Advanced Development</i>	<b>Project (Number/Name)</b> ET8 / <i>Personnel Airdrop System Development</i>
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<b>Product Development (\$ in Millions)</b>				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Developmental Contracts	C/FFP	TBD : TBD	-	0.255		0.953		0.590		-		0.590	2.588	4.386	-
Engineering Support	MIPR	CCDC Natick, MA : various	0.556	-		-		0.101		-		0.101	0.827	1.484	-
<b>Subtotal</b>			0.556	0.255		0.953		0.691		-		0.691	3.415	5.870	N/A

<b>Support (\$ in Millions)</b>				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Program Management Support	Allot	PM SCIE : Belvoir	0.345	0.030		0.266		0.125		-		0.125	0.811	1.577	-
<b>Subtotal</b>			0.345	0.030		0.266		0.125		-		0.125	0.811	1.577	N/A

<b>Test and Evaluation (\$ in Millions)</b>				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Test and Evaluation	MIPR	TBD : TBD	0.635	-		-		0.339		-		0.339	0.782	1.756	-
<b>Subtotal</b>			0.635	-		-		0.339		-		0.339	0.782	1.756	N/A

	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract	
<b>Project Cost Totals</b>		1.536	0.285	1.219	1.155	-	1.155	5.008	9.203	N/A

**Remarks**

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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2022 Army</b>		<b>Date: May 2021</b>
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603827A / <i>Soldier Systems - Advanced Development</i>	<b>Project (Number/Name)</b> ET8 / <i>Personnel Airdrop System Development</i>

Event Name	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Evaluate Component and Subsystem Technologies	[Blue bar]																											
Develop Smart Universal Static line Hook (SUSH)									[Blue bar]																			
Static Line T-11R AAD Development			[Blue bar]																									
High Altitude Insertion Enhancements													[Blue bar]															
Next Generation Low Altitude Parachute System													[Blue bar]															

**Note**  
High Altitude Insertion Enhancements includes the following: Glide Technology, Situational Awareness Aids, and GPS Denied Navigation Aid.

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603827A / <i>Soldier Systems - Advanced Development</i>	<b>Project (Number/Name)</b> ET8 / <i>Personnel Airdrop System Development</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Evaluate Component and Subsystem Technologies	1	2019	4	2023
Develop Smart Universal Static line Hook (SUSH)	1	2022	4	2022
Static Line T-11R AAD Development	3	2020	4	2023
High Altitude Insertion Enhancements	1	2023	4	2027
Next Generation Low Altitude Parachute System	1	2023	4	2025

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**Exhibit R-2A, RDT&E Project Justification:** PB 2022 Army **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603827A / <i>Soldier Systems - Advanced Development</i>	<b>Project (Number/Name)</b> S53 / <i>Clothing And Equipment</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
<i>S53: Clothing And Equipment</i>	-	6.365	1.742	2.004	-	2.004	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

**A. Mission Description and Budget Item Justification**

Funding in this project supports the Army's Cross Functional Teams (CFT) initiatives. This Project supports efforts to evaluate and integrate technologies and representative or prototype systems that help expedite Soldier Clothing and Individual Equipment technology transition from the laboratory to operational use. Efforts focus on proving out commonality across a broad spectrum of users to provide a modular, integrated uniform/clothing system from base layer to outer layer and head-to-toe. It funds efforts to transition new, improved technologies and domestically available fabrics with capabilities such as Flame Resistance (FR), moisture wicking, insect protection and innovative camouflage technologies to include female specific uniform items. This project also funds integration of fabrics for uniforms and equipment for use in a multitude of environment, like jungle, tropical and arctic. New technologies are identified to monitor health and improve Soldier survivability, reduce weight, and improve affordability, mobility and comfort in combat and training/administrative environments. This program supports research and development to improve individual soldier equipment resulting in enhanced survivability on the battlefield in austere conditions. This project will transition capabilities from our Science and Technology partners to increase performance and safety of Soldier clothing and equipment. It will continue to support cross-service initiatives to increase commonality across the adaptive system architecture. This technology enables combat operations in a gender integrated fighting force.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	FY 2020	FY 2021	FY 2022
<p><b>Title:</b> Soldier Uniforms and Clothing</p> <p><b>Description:</b> Develop superior and sustainable integrated clothing and footwear for the Soldier in a rapidly changing global environment.</p> <p><b>FY 2021 Plans:</b> Continue Flame Resistant clothing upgrades. Analyze Flame Resistant garment upgrades and review/improve testing protocols. Continue Signature Management efforts in Camouflage Flame Resistant clothing and equipment. Develop enhanced OCIE capabilities for Soldiers operating in cold and extreme cold environments. Continue testing novel materials and processes to improve clothing and equipment for extreme climates. Improve size standardization for all individually sized items.</p> <p><b>FY 2022 Plans:</b> Funding supports the Secretary of the Army's directive to identify opportunities for commonality in OCIE across all Services (Army, Navy, Air Force, Marines, Coast Guard). Evaluate transitioned fabric and system designs that provide specific protection, enhanced camouflage and identification capability and improved comfort for inclusion in tactical and environmental clothing. Transition materials for incorporation into combat uniforms to enhance Identification Friend or Foe (IFF). Transition functional textiles to mitigate Ground Surveillance Radar (GSR) detection by opposing forces. Transition materials that will improve cooling/airflow for dismounted Soldiers and reduce thermal signature to further mitigate detection. Investigate and evaluate</p>	1.893	1.365	1.616

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603827A / <i>Soldier Systems - Advanced Development</i>	<b>Project (Number/Name)</b> S53 / <i>Clothing And Equipment</i>

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
<p>conductive textiles (fabric level). Transition materials that will protect against emerging microwave threats. Continue uniform, clothing, and footwear improvements with an emphasis on commonality. Analyze Flame Resistant garment upgrades and review/improve testing protocols. Continue to develop novel solutions for parachutist clothing above 25,000 feet. Develop enhanced Organizational Clothing and Individual Equipment capabilities for Soldiers operating all climatic zones and environments. Continue testing novel materials and processes to improve clothing and equipment for all climates. Improve size standardization for all individually sized items.</p> <p><b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> Funding increase from Fiscal Year (FY) 2021 to FY 2022 due to anticipated changes in requirements.</p>			
<p><b>Title:</b> Individual Equipment</p> <p><b>Description:</b> Develop and provide superior and sustainable integrated individual equipment for the Soldier in a rapidly changing global environment.</p> <p><b>FY 2021 Plans:</b> Analyze Flame Resistant garment upgrades and review/improve testing protocols. Begin development of a Toxic Industrial Chemicals/Toxic Industrial Materials (TIC/TIM) filtration capability for the Individual Water Treatment Device (IWTD). Evaluate current load carriage equipment to assess its ability to support the modernization of current individual weapons and situational awareness capabilities. Optimize the capability of Load Carriage items to support modernization for weapons and tactical gear.</p> <p><b>FY 2022 Plans:</b> Funding supports the Secretary of the Army's directive to identify opportunities for commonality in SCIE across all Services (Army, Navy, Air Force, Marines, Coast Guard). Evaluate new technology for the desalinization of salt water as part of the Individual Water Treatment Device program. Evaluate new technology to effectively camouflage and reduce thermal signature on exposed skin (face, neck, hands, etc) and technology to temporarily camouflage individual equipment. Evaluate materials and perform laboratory testing to support down-selection in support of Cold Weather Gear and Cold Weather Survival Blanket programs. Evaluate current load carriage equipment to assess its ability to support the modernization of current individual weapons and situational awareness capabilities. Continue to optimize the capability of Load Carriage items to support modernization for weapons and tactical gear. Develop individual over the snow mobility and protection equipment.</p> <p><b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> Funding increase from FY 2021 to FY 2022 due to anticipated changes in requirements.</p>	0.472	0.377	0.388
<b>Accomplishments/Planned Programs Subtotals</b>	2.365	1.742	2.004

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603827A / <i>Soldier Systems - Advanced Development</i>	<b>Project (Number/Name)</b> S53 / <i>Clothing And Equipment</i>

	FY 2020	FY 2021
<b>Congressional Add:</b> Cold Weather Clothing	4.000	-
<b>FY 2020 Accomplishments:</b> Cold Temperature Arctic Protection System (CTAPS)- Continued research and development on novel fabrics, fibers and technology that can be applied or used in garment end items to enhance Soldier environmental protection. This research included, but not limited to woven, knit, natural and man-made fibers, laminates, coatings insulated layers and end-items that will enhance soldier protection while allowing longer exposure times. Created a Start-guide application to assist the warfighter in the correct usage of CTAPS, which will improve functionality and fit for Soldiers.		
Investigated and Developed an insulated ensemble that can be used by high altitude parachutists. This ensemble will support extremely cold temperatures experienced at high altitudes, for example above 25,000 feet/-40 degrees Fahrenheit. Areas of protection include face, hands, arms and torso during long exposure times (>60min) while under canopy.		
Continued development of the process for the mercerization of wool for softer wool for next to skin applications.		
Conducted probability of detection study to determine how the currently issued overwhites perform against enemy sensors such as Short Wave Infrared and Thermal.		
<b>Congressional Adds Subtotals</b>	4.000	-

**C. Other Program Funding Summary (\$ in Millions)**

Line Item	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
• S60: <i>Clothing &amp; Equipment</i>	6.188	6.472	5.393	-	5.393	-	-	-	-	-	-

**Remarks**

**D. Acquisition Strategy**

Programs pursue technology maturation and prototype development, culminating in the transition of mature technologies (Technology Readiness Level (TRL) 6-7) to Systems Development and Demonstration. This Project continues to exercise competitively awarded contracts using best value source selection procedures.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army												Date: May 2021			
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)							
2040 / 4				PE 0603827A / Soldier Systems - Advanced Development				S53 / Clothing And Equipment							
Management Services (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Management Support	TBD	PM SCIE : Ft. Belvoir, VA	15.780	0.296		0.282		0.236		-		0.236	Continuing	Continuing	Continuing
<b>Subtotal</b>			15.780	0.296		0.282		0.236		-		0.236	Continuing	Continuing	N/A
Product Development (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Engineering Support	MIPR	NSRDEC : Natick, MA	16.665	1.441		0.334		0.434		-		0.434	Continuing	Continuing	Continuing
Development Contracts	C/FFP	Various : Various	34.804	2.487		0.360		0.446		-		0.446	Continuing	Continuing	Continuing
<b>Subtotal</b>			51.469	3.928		0.694		0.880		-		0.880	Continuing	Continuing	N/A
Support (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Office Support Costs	MIPR	Natick, MA : Natick, MA	8.704	0.296		0.310		0.306		-		0.306	Continuing	Continuing	Continuing
<b>Subtotal</b>			8.704	0.296		0.310		0.306		-		0.306	Continuing	Continuing	N/A
Test and Evaluation (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Testing Costs	MIPR	Various : Various	27.350	1.845		0.456		0.582		-		0.582	Continuing	Continuing	Continuing
<b>Subtotal</b>			27.350	1.845		0.456		0.582		-		0.582	Continuing	Continuing	N/A

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<b>Exhibit R-3, RDT&amp;E Project Cost Analysis: PB 2022 Army</b>								<b>Date: May 2021</b>					
<b>Appropriation/Budget Activity</b> 2040 / 4				<b>R-1 Program Element (Number/Name)</b> PE 0603827A / <i>Soldier Systems - Advanced Development</i>				<b>Project (Number/Name)</b> S53 / <i>Clothing And Equipment</i>					
	<b>Prior Years</b>	<b>FY 2020</b>		<b>FY 2021</b>		<b>FY 2022 Base</b>		<b>FY 2022 OCO</b>		<b>FY 2022 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Project Cost Totals</b>	103.303	6.365		1.742		2.004		-		2.004	Continuing	Continuing	N/A

Remarks



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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2022 Army</b>			<b>Date: May 2021</b>		
<b>Appropriation/Budget Activity</b> 2040 / 4		<b>R-1 Program Element (Number/Name)</b> PE 0603827A / <i>Soldier Systems - Advanced Development</i>		<b>Project (Number/Name)</b> S53 / <i>Clothing And Equipment</i>	

Event Name	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
<b>UNIFORM CLOTHING</b>																												
Flame Resistant Clothing Improvements																												
Improve Signature Mgmt Infrared (IR) Eval & Camo in Clothing &																												
Cold Weather/ Extreme Cold Weather (CW/ECW) Clothing Impro																												
Cold Weather/ Extreme Cold Weather (CW/ECW) Handwear																												
Novel Materials Development																												
Size Standardization across the services																												
<b>INDIVIDUAL EQUIPMENT</b>																												
Multi-purpose Personal Hydration System (MPHS) Shelf-life Ext																												
Develop Water Treatment Device																												
Over the Snow mobility and protection																												
Thermal Signature Reduction																												
Cold Weather Canteen																												

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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2022 Army</b>			<b>Date: May 2021</b>		
<b>Appropriation/Budget Activity</b> 2040 / 4		<b>R-1 Program Element (Number/Name)</b> PE 0603827A / <i>Soldier Systems - Advanced Development</i>		<b>Project (Number/Name)</b> S53 / <i>Clothing And Equipment</i>	

Event Name	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Load Carriage																												

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603827A / <i>Soldier Systems - Advanced Development</i>	<b>Project (Number/Name)</b> S53 / <i>Clothing And Equipment</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
UNIFORM CLOTHING	1	2010	4	2025
Flame Resistant Clothing Improvements	1	2012	4	2023
Improve Signature Mgmt Infrared (IR) Eval & Camo in Clothing & Equipment	2	2012	4	2026
Cold Weather/ Extreme Cold Weather (CW/ECW) Clothing Improvements	1	2019	4	2025
Cold Weather/ Extreme Cold Weather (CW/ECW) Handwear	1	2020	3	2022
Novel Materials Development	1	2020	4	2026
Size Standardization across the services	1	2021	4	2023
INDIVIDUAL EQUIPMENT	4	2015	4	2025
Multi-purpose Personal Hydration System (MPHS) Shelf-life Extension Evaluation	1	2019	4	2024
Develop Water Treatment Device	1	2022	4	2024
Over the Snow mobility and protection	1	2022	4	2024
Thermal Signature Reduction	1	2021	4	2026
Cold Weather Canteen	1	2020	4	2022
Load Carriage	1	2020	4	2026

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**Exhibit R-2A, RDT&E Project Justification:** PB 2022 Army **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603827A / <i>Soldier Systems - Advanced Development</i>	<b>Project (Number/Name)</b> S54 / <i>Small Arms Improvement</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
<i>S54: Small Arms Improvement</i>	-	13.956	15.495	6.911	-	6.911	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

**A. Mission Description and Budget Item Justification**

The Small Arms Improvement Advanced Component Development and Prototypes (ACD&P) program provides funds to mature, demonstrate, test and evaluate emerging technology from Budget Activity (BA) 3 Program Element (PE) 0603607A Joint Service Small Arms Program (JSSAP) Project 627 Defense Advanced Research Projects Agency (DARPA), Department of Energy National Laboratories, Research Development & Engineering Centers (RDECs) and other domestic and foreign sources for small arms weapon systems and technology. Small Arms Improvement supports the Army Modernization priorities (Build a More Lethal Force) through enhancement of Joint Lethality in contested environments by minimizing and eliminating erosion of close combat capability relative to peer competitors in complex terrain as outlined in the National Defense Strategy (NDS). Small Arms weapon systems include weapons ranging up to 40 millimeter in caliber and recoilless rifles. Current and future efforts focus on improvements designed to enhance lethality, target acquisition and tracking, fire control, usability, training effectiveness and reliability of weapons to include ammunition when developing and/or evaluating standard and non-standard weapons. Focus areas include the maturing of technology through testing and evaluation of sub-system or system prototypes which demonstrates light weight materials, wear resistant/protective/anti-reflective coatings, observation/situational awareness improvements, human-systems integration, robotic armament capability, non-lethal capability, and equipment enhancements. Benefits include continuous improvements to small arms weapon systems, fire control equipment, optics, gun barrels, training devices, suppressors, component mounts, weapon mounts, ancillary items and weapon/ammunition interface. Includes costs associated with efforts for integration and interface of products on Soldiers' head, body and weapons.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	FY 2020	FY 2021	FY 2022
<b>Title:</b> New Weapon Systems	1.500	2.590	0.336
<b>Description:</b> Development of new small arms weapon systems.			
<b>FY 2021 Plans:</b>			
Next Generation Weapons will begin to support technology development for future Next Generation Weapon variants addressing operational force needs for increased lethality, increased probability of hit, increased soldier acceptance, decreased signature, reduced recoil, reduced soldier aim error, and reduced engagement time. New weapons may be variants or enhancements of the NGSW-R and NGSW-AR or new weapon platforms to fulfill other roles such as machine guns, sniper rifles, and others.			
Externally Powered Weapon will complete maturation and upgrade of prototype system based on test and experimentation results. Continue with integration of intelligence/networking/remote operation capabilities. Will work with Maneuver and Maneuver Support Capabilities Development and Integration Directorate (M-CDID and MS-CDID) Futures and Concepts Centers regarding the Capability Development Document.			

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army		<b>Date:</b> May 2021		
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603827A / <i>Soldier Systems - Advanced Development</i>	<b>Project (Number/Name)</b> S54 / <i>Small Arms Improvement</i>		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
<p>New and Legacy Weapon Systems Evaluation and Assessments: Will perform initial and follow-on evaluations, assessments and integration of new weapons to include various new weapon system platforms.</p> <p><b>FY 2022 Plans:</b> Advanced Technologies for Machine Gun: Will conduct market research, evaluations, trade studies and assessments for new Medium Machine Gun technologies to address capability needs. These technologies may include, but are not limited to, novel recoil mitigation, alternative lightweight materials, barrel technologies, suppressor technologies, mounting and fire control interfaces.</p> <p>New and Legacy Weapon Systems Evaluation and Assessments: Will continue to perform initial and follow-on evaluations, assessments and integration of new weapons to include various new weapon system platforms.</p> <p><b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> FY 2022 Decrease due to Next Generation Squad Weapon progression into 6.5 RDTE.</p>				
<p><b>Title:</b> Small Arms Weapon Systems Enhancements</p> <p><b>Description:</b> Enhancements and development of small arms weapon systems.</p> <p><b>FY 2021 Plans:</b> Next Generation Weapons/Enhancements will begin to support technology development for future Next Generation Weapon variants addressing operational force needs for increased lethality, increased probability of hit, increased soldier acceptance, decreased signature, reduced recoil, reduced soldier aim error, and reduced engagement time. New weapons may be variants or enhancements of the Next Generation Squad Weapon Rifle (NGSW-R) and Next Generation Squad Automatic Rifle (NGSAR) or new weapon platforms to fulfill other roles such as machine guns, sniper rifles, and others.</p> <p>Small Business Innovative Research (SBIR) Enhancements: Continue future efforts to focus on improvements designed to enhance lethality, target acquisition and tracking, fire control, training effectiveness and reliability of weapons.</p> <p>Advanced Small Unit Technologies: Will investigate and demonstrate advanced technologies to achieve capabilities identified in the draft Tiered Capabilities Matrix (TCM) for the Precision Grenadier System (PGS) as well as potential use in future fire control and weapon modernization efforts.</p> <p>Enhanced System for Remote Weapon Stations &amp; Kinetic Counter-UAS Weapons: Will evaluate the integration of an Inertial Navigation System (INS) to the CROWS to enhance the CROWS overall spatial environment awareness and improve accuracy</p>		6.385	8.058	2.475

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603827A / <i>Soldier Systems - Advanced Development</i>	<b>Project (Number/Name)</b> S54 / <i>Small Arms Improvement</i>

**B. Accomplishments/Planned Programs (\$ in Millions)**

	FY 2020	FY 2021	FY 2022
<p>in slewing to targets provided from external remote sources. i.e. off-board radar systems in support of network lethality operation. Also software development and integration to include BLADE CUAS kinetic defeat functionality into the CROWS Baseline software. Prototyping and testing of an enhanced CROWS slip ring to incorporate full 360 degree operation of BLADE CUAS kinetic defeat functionality on CROWS and provide ability to integrate other sensors and effectors onto the CROWS platform.</p> <p>Non-Standard Weapons Assessments will conduct baseline testing of commercial weapon systems and perform capability analysis of unique weapon characteristics. Will utilize test information to conduct trade off assessments of Non-Developmental Item solutions for pending requirements as well as establish safety parameters for the training mission of Regionally Aligned Forces and other non Department of Defense (DOD) customers. Will establish a sustainment strategy for long term support of weapons procured to support the training of Regionally Aligned Forces and Security Force Assistance Brigades in foreign weapons. Will conduct safety assessments of limited distribution materiel systems considered for Table of Organization and Equipment (TOE) and Common Table of Allowances (CTA) approvals. Will conduct market research of commercially available weapon systems.</p> <p>Picatinny Smart Rail System Controller and Remote will integrate different components together and then demonstrate its ability to control devices and manage data traffic. The completion of this effort will provide a path for future capability growth to systems such as Next Generation Squad Weapon Fire Control, Fire Control for M3E1, and Family of Weapon Sights ? Individual (FWS-I). This effort will be critical in ensuring we don't have duplicative hardware on weapon systems as well as ensuring the devices on the weapons can properly communicate with each other.</p> <p>Power and Data Integration onto Open Architecture Accessory Rails will integrate power and data capability onto a Modern Lock (M-Lok) style rail. This will have potential applicability to Next Generation Squad Weapon-Rifle/Automatic Rifle, Precision Sniper Rifle, and Next Generation Medium/Heavy Machine Gun.</p> <p>Current and Legacy Weapon Improvements will assess and evaluate selected capabilities and improvements for all current and legacy weapon systems.</p> <p><b>FY 2022 Plans:</b> Small Business Innovative Research (SBIR) Enhancements: Will continue future efforts to focus on improvements designed to enhance lethality, target acquisition and tracking, fire control, training effectiveness and reliability of weapons.</p> <p>Next Generation Weapons/Enhancements continue to support technology development for future Next Generation Weapon variants addressing operational force needs for increased lethality, increased probability of hit, increased soldier acceptance, decreased signature, reduced recoil, reduced soldier aim error, and reduced engagement time. New weapons may be variants or</p>			

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603827A / <i>Soldier Systems - Advanced Development</i>	<b>Project (Number/Name)</b> S54 / <i>Small Arms Improvement</i>

**B. Accomplishments/Planned Programs (\$ in Millions)**

	FY 2020	FY 2021	FY 2022
<p>enhancements of the Next Generation Squad Weapon Rifle (NGSW-R) and Next Generation Squad Automatic Rifle (NGSAR) or new weapon platforms to fulfill other roles such as machine guns, sniper rifles, and others.</p> <p>Advanced Small Unit Technologies: Will continue to investigate and demonstrate advanced technologies to achieve capabilities identified as a capability gap for targets in defilade in the draft Tiered Capabilities Matrix (TCM) as well as potential use in future fire control and weapon modernization efforts.</p> <p>Enhanced System for Remote Weapon Stations &amp; Kinetic Counter-UAS Weapons: Will evaluate the integration of an Inertial Navigation System (INS) to the CROWS to enhance the CROWS overall spatial environment awareness and improve accuracy in slewing to targets provided from external remote sources. i.e. off-board radar systems in support of network lethality operation. Also software development and integration to include BLADE CUAS kinetic defeat functionality into the CROWS Baseline software. Prototyping and testing of an enhanced CROWS slip ring to incorporate full 360 degree operation of BLADE CUAS kinetic defeat functionality on CROWS and provide ability to integrate other sensors and effectors onto the CROWS platform.</p> <p>Non-Standard Weapons Assessments: Will continue to conduct baseline testing of commercial weapon systems and perform capability analysis of unique weapon characteristics. Continue to utilize test information to conduct trade off assessments of Non-Developmental Item solutions for pending requirements as well as establish safety parameters for the training mission of Regionally Aligned Forces, Security Force Assistance Brigades, and other Department of Defense (DOD) customers. Will continue to establish a sustainment strategy for long term support of weapons procured to support the Regionally Aligned Forces and Security Force Assistance Brigade training missions. Will conduct safety assessments of limited distribution materiel systems considered for Table of Organization and Equipment (TOE) and Common Table of Allowances (CTA) approvals. Continue to conduct market research of commercially available weapon systems.</p> <p>Picatinny Smart Rail System Controller and Remote will continue to integrate different components together and then demonstrate its ability to control devices and manage data traffic. The completion of this effort will provide a path for future capability growth to systems such as, but not limited to Next Generation Squad Weapon Fire Control, Fire Control for M3E1, and Family of Weapon Sights ? Individual (FWS-I). This effort will be critical in ensuring we don't have duplicative hardware on weapon systems as well as ensuring the devices on the weapons can properly communicate with each other.</p> <p>Power and Data Integration onto Open Architecture Accessory Rails will continue to integrate power and data capability in a negative space rail system. This will have potential applicability to systems such as, but not limited to Next Generation Squad Weapon-Rifle/Automatic Rifle, Precision Sniper Rifle, and Next Generation Medium/Heavy Machine Gun.</p>			

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army		<b>Date:</b> May 2021		
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603827A / <i>Soldier Systems - Advanced Development</i>	<b>Project (Number/Name)</b> S54 / <i>Small Arms Improvement</i>		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
Current and Legacy Weapon Improvements will continue to assess and evaluate selected capabilities and improvements for all current and legacy weapon systems.  <b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> FY 2022 Decrease due to technology progression into 6.5 RDTE.				
<b>Title:</b> Ammunition <b>Description:</b> Small arms ammunition improvement.		0.100	-	-
<b>Title:</b> Combat Optics <b>Description:</b> Improvement of small arms combat optics.  <b>FY 2021 Plans:</b> Advanced Combat Optics (formerly called Next Generation Optics): Will integrate current and emerging target acquisition component technologies into binoculars and variable magnification spotting scopes. Will evaluate state of the art advances in optical component technologies for inclusion in future combat optic products.  <b>FY 2022 Plans:</b> Advanced Combat Optics (formerly called Next Generation Optics): Will continue to integrate current and emerging target acquisition component technologies such as, but not limited to rifle optics, binoculars and variable magnification spotting scopes. Will continue to evaluate state of the art advances in optical component technologies for inclusion in future combat optic products.  <b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> FY 2022 Decrease due to technology progression into 6.5 RDTE.		0.100	0.100	0.050
<b>Title:</b> Fire Control <b>Description:</b> Small arms fire control.  <b>FY 2021 Plans:</b> Next Generation Fire Control Technology Enhancements will support technology integration with Next Generation Weapons addressing soldier aim error, engagement time, probability of hit, situational awareness, lethality, and soldier acceptance. Iterative prototyping will be utilized to develop component technologies to support future variants of the Next Generation Squad Weapon. Technology may include enhanced camera based technology, target tracking, automatic target detection, increased networked lethality, reduced signature, increased user acceptance, along with other emerging weapon, ammunition, and fire control technologies that will increase the lethality of the next generation squad weapons.		5.821	4.000	4.000



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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army		<b>Date:</b> May 2021
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<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
<p>Small Arms Fire Control Enhancements / Wind Sensing will research test and evaluation efforts on laser based wind sensors, proof-of-concept devices, and other optical designs for prototypes that incorporate fire control sensors and ballistic solver software and integration of sensor input and communication with ammunition for all small arms weapon platforms.</p> <p><b>FY 2022 Plans:</b> Next Generation and Fire Control Technology Enhancements: Will continue to support technology integration with Next Generation Weapons addressing soldier aim error, engagement time, probability of hit, situational awareness, lethality, and soldier acceptance. Iterative prototyping will be utilized to develop component technologies to support future variants of the Next Generation Squad Weapon. Technology may include enhanced camera based technology, target tracking, automatic target detection, increased networked lethality, reduced signature, increased user acceptance, along with other emerging weapon, ammunition, and fire control technologies that will increase the lethality of the next generation squad weapons.</p> <p>Small Arms Fire Control Enhancements / Wind Sensing: Will continue research test and evaluation efforts on laser based wind sensors, proof-of-concept devices, and other optical designs for prototypes that incorporate fire control sensors and ballistic solver software and integration of sensor input and communication with ammunition for all small arms weapon platforms. The purpose of this effort is to evaluate downrange wind sensing technologies for incorporation into future fire control systems. Downrange wind sensing is the largest unmeasured variable remaining in ballistic calculation.</p>			
<p><b>Title:</b> Research and Analysis</p> <p><b>Description:</b> Research and analysis of small arms.</p> <p><b>FY 2021 Plans:</b> Will conduct Market Research and Benefit Analysis of 360 degree situational awareness, active stabilization, advanced kinetic weapons, low flying drone engagement, and other small arms research to include new technologies in emerging robotic and aerial armaments.</p> <p><b>FY 2022 Plans:</b> Plan to continue Market Research and Benefit Analysis of 360 degree situational awareness, active stabilization, advanced kinetic weapons, low flying drone engagement, and other small arms research to include new technologies in emerging robotic and aerial armaments.</p> <p><b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> FY 2022 Decrease due to technology progression into 6.5 RDTE.</p>	0.050	0.747	0.050
<b>Accomplishments/Planned Programs Subtotals</b>	13.956	15.495	6.911

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army	<b>Date:</b> May 2021
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<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603827A / <i>Soldier Systems - Advanced Development</i>	<b>Project (Number/Name)</b> S54 / <i>Small Arms Improvement</i>
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**C. Other Program Funding Summary (\$ in Millions)**

<u>Line Item</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022</u> <u>Base</u>	<u>FY 2022</u> <u>OCO</u>	<u>FY 2022</u> <u>Total</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>FY 2026</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• EW4: <i>Crew Served Weapons Engineering Development</i>	3.982	9.608	2.443	-	2.443	-	-	-	-	-	-
• FF2: <i>Small Arms Fire Control</i>	14.095	9.782	11.107	-	11.107	-	-	-	-	-	-
• FI2: <i>Lightweight 30mm Cannon</i>	1.327	-	-	-	-	-	-	-	-	-	-
• FM4: <i>Next Generation Squad Weapons</i>	31.719	32.001	13.599	-	13.599	-	-	-	-	-	-
• S63: <i>Individual Weapons Engineering Development</i>	2.586	4.214	3.651	-	3.651	-	-	-	-	-	-
• FL4: <i>Small Caliber Ammo for Next Gen Squad Weapons</i>	17.432	26.483	28.372	-	28.372	-	-	-	-	-	-
• E06002: <i>NEXT GENERATION COMBAT ROUND</i>	-	11.988	65.056	-	65.056	-	-	-	-	-	-

**Remarks**

In support of Small Arms Initial Capability and Capability Development Requirements, advanced technology of small arms weapon systems is transitioned from Joint Service Small Arms Program (JSSAP), Project 627, Program Element 0603607A, (Budget Activity 3) to Small Arms Improvement, Project S54, Program Element 0603827A, (Budget Activity 4). After the technology is demonstrated and/or validated, the program transitions to Infantry Support Weapons, Program Element 0604601A, (Budget Activity 5) for engineering and manufacturing development.

In FY 2022, funding in the amount of \$0.366 million for manpower was realigned to Operations and Maintenance. Program support costs have been accurately updated to reflect the realignments."

**D. Acquisition Strategy**

Primary strategy is to study, develop, demonstrate and evaluate emerging technologies that ultimately lead to modernizing, enhancing and/or improving the small arms inventory.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army												Date: May 2021			
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)							
2040 / 4				PE 0603827A / Soldier Systems - Advanced Development				S54 / Small Arms Improvement							
Management Services (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Management	Allot	PM Soldier Weapons, : Picatinny Arsenal	7.486	0.400	Mar 2020	0.560	Mar 2021	0.280	Mar 2022	-		0.280	Continuing	Continuing	Continuing
FY2019 SBIR / STTR Transfer	FFRDC	Army Budget Office : Pentagon, Washington DC	0.282	-		-		-		-		-	Continuing	Continuing	Continuing
<b>Subtotal</b>			7.768	0.400		0.560		0.280		-		0.280	Continuing	Continuing	N/A
Product Development (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Hardware Development	MIPR	Army Research Development Engineering Centers, : Multiple	37.403	9.655	Mar 2020	9.918	Mar 2021	4.461	Mar 2022	-		4.461	Continuing	Continuing	Continuing
<b>Subtotal</b>			37.403	9.655		9.918		4.461		-		4.461	Continuing	Continuing	N/A
Support (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Engineering	MIPR	Army Research Development Engineering Centers, : Multiple	28.213	2.000	Mar 2020	2.240	Mar 2021	0.980	Mar 2022	-		0.980	Continuing	Continuing	Continuing
<b>Subtotal</b>			28.213	2.000		2.240		0.980		-		0.980	Continuing	Continuing	N/A



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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2022 Army</b>		<b>Date: May 2021</b>
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603827A / <i>Soldier Systems - Advanced Development</i>	<b>Project (Number/Name)</b> S54 / <i>Small Arms Improvement</i>

Event Name	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
<b>NEW WEAPON SYSTEMS</b>																												
Next Generation Automatic-Rifle																												
Next Generation Squad Weapon-Rifle																												
Externally Powered Weapon (EPW)																												
Advanced Technologies for Machine Gun																												
New and Legacy Weapon Systems Evaluation and Assessment																												
<b>SMALL ARMS WEAPON SYSTEMS ENHANCEMENTS</b>																												
Armaments for Robots																												
Recoil Reduction Mechanism																												
Advanced Small Unit Technology																												
Non-Standard Weapon Assessments																												
Advanced Squad Designated Marksman Rifle (SDMR)																												
556 Enhancements																												

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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2022 Army</b>		<b>Date: May 2021</b>
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603827A / <i>Soldier Systems - Advanced Development</i>	<b>Project (Number/Name)</b> S54 / <i>Small Arms Improvement</i>

Event Name	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Picatinny Smart Rail System Controller and Remote	[REDACTED]				[REDACTED]				[REDACTED]				[REDACTED]				[REDACTED]				[REDACTED]							
Power and Data Integration onto Open Architecture Accessory Rails					[REDACTED]				[REDACTED]				[REDACTED]				[REDACTED]				[REDACTED]							
Enhanced System for Remote Weapon Stations & Kinetic Co	[REDACTED]				[REDACTED]				[REDACTED]				[REDACTED]				[REDACTED]				[REDACTED]							
Small Business Innovative Research	[REDACTED]				[REDACTED]				[REDACTED]				[REDACTED]				[REDACTED]				[REDACTED]							
Current and Legacy Weapon Improvements	[REDACTED]				[REDACTED]				[REDACTED]				[REDACTED]				[REDACTED]				[REDACTED]							
<b>AMMUNITION</b>	[REDACTED]				[REDACTED]				[REDACTED]				[REDACTED]				[REDACTED]				[REDACTED]							
Ammunition Upgrades	[REDACTED]				[REDACTED]				[REDACTED]				[REDACTED]				[REDACTED]				[REDACTED]							
<b>COMBAT OPTICS</b>	[REDACTED]				[REDACTED]				[REDACTED]				[REDACTED]				[REDACTED]				[REDACTED]							
Advanced Combat Optics	[REDACTED]				[REDACTED]				[REDACTED]				[REDACTED]				[REDACTED]				[REDACTED]							
<b>FIRE CONTROL</b>	[REDACTED]				[REDACTED]				[REDACTED]				[REDACTED]				[REDACTED]				[REDACTED]							
Small Arms Fire Control Enhancements / Wind Sensing	[REDACTED]				[REDACTED]				[REDACTED]				[REDACTED]				[REDACTED]				[REDACTED]							
Next Generation and Fire Control Technology Enhancements	[REDACTED]				[REDACTED]				[REDACTED]				[REDACTED]				[REDACTED]				[REDACTED]							
<b>RESEARCH AND ANALYSIS</b>	[REDACTED]				[REDACTED]				[REDACTED]				[REDACTED]				[REDACTED]				[REDACTED]							

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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2022 Army</b>			<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603827A / <i>Soldier Systems - Advanced Development</i>	<b>Project (Number/Name)</b> S54 / <i>Small Arms Improvement</i>	

Event Name	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Research and Analysis of Small Arms																												

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<b>Exhibit R-4A, RDT&amp;E Schedule Details: PB 2022 Army</b>		<b>Date: May 2021</b>
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603827A / <i>Soldier Systems - Advanced Development</i>	<b>Project (Number/Name)</b> S54 / <i>Small Arms Improvement</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
NEW WEAPON SYSTEMS	1	2008	4	2026
Next Generation Automatic-Rifle	1	2014	4	2020
Next Generation Squad Weapon-Rifle	2	2019	4	2020
Externally Powered Weapon (EPW)	1	2019	4	2021
Advanced Technologies for Machine Gun	1	2022	4	2027
New and Legacy Weapon Systems Evaluation and Assessments	1	2020	4	2026
SMALL ARMS WEAPON SYSTEMS ENHANCEMENTS	1	2008	4	2026
Armaments for Robots	1	2020	4	2020
Recoil Reduction Mechanism	1	2020	4	2021
Advanced Small Unit Technology	1	2021	4	2022
Non-Standard Weapon Assessments	1	2020	4	2022
Advanced Squad Designated Marksman Rifle (SDMR)	1	2023	4	2025
556 Enhancements	1	2023	4	2024
Picatinny Smart Rail System Controller and Remote	1	2021	4	2024
Power and Data Integration onto Open Architecture Accessory Rails	1	2021	4	2024
Enhanced System for Remote Weapon Stations & Kinetic Counter-UAS Weapons	1	2020	4	2027
Small Business Innovative Research	1	2015	4	2026
Current and Legacy Weapon Improvements	1	2020	4	2026
AMMUNITION	1	2016	4	2020
Ammunition Upgrades	1	2016	4	2020
COMBAT OPTICS	1	2008	4	2026
Advanced Combat Optics	1	2020	4	2026



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**Exhibit R-4A, RDT&E Schedule Details: PB 2022 Army** **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603827A / <i>Soldier Systems - Advanced Development</i>	<b>Project (Number/Name)</b> S54 / <i>Small Arms Improvement</i>
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Events	Start		End	
	Quarter	Year	Quarter	Year
FIRE CONTROL	1	2008	4	2026
Small Arms Fire Control Enhancements / Wind Sensing	1	2017	4	2024
Next Generation and Fire Control Technology Enhancements	1	2019	4	2026
RESEARCH AND ANALYSIS	1	2012	4	2026
Research and Analysis of Small Arms	1	2015	4	2026

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**Exhibit R-2A, RDT&E Project Justification:** PB 2022 Army **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4					<b>R-1 Program Element (Number/Name)</b> PE 0603827A / <i>Soldier Systems - Advanced Development</i>				<b>Project (Number/Name)</b> VS4 / <i>Soldier Protective Equipment</i>			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022 Base</b>	<b>FY 2022 OCO</b>	<b>FY 2022 Total</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>FY 2026</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
VS4: <i>Soldier Protective Equipment</i>	-	2.720	2.279	4.278	-	4.278	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

Funding in this project supports the Army's Cross Functional Teams' (CFT) initiatives. This Project supports efforts to evaluate integrated technologies and representative or prototype systems that help expedite Personal Protective Equipment (PPE) technology transition from the laboratory to operational use. This project will transition capabilities from our Science and Technology partners to increase performance and safety of Soldier clothing and protective equipment. It will continue to support cross-service initiatives to increase commonality.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	FY 2020	FY 2021	FY 2022
<b>Title:</b> Soldier Protective Equipment (SPE)	2.720	2.279	4.278
<b>Description:</b> Effort to increase Warfighter survivability and mobility by optimizing Soldier protection while effectively managing all life cycle aspects of Personal Protective Equipment (PPE).			
<b>FY 2021 Plans:</b> Project will continue Technology/Maturation and Risk Reduction efforts across the PPE portfolio: Torso and Extremity Protection (TEP); Vital Torso Protection (VTP); Integrated Head Protection System (IHPS); Next Generation (NG) IHPS, and Military Combat Eye Protection (MCEP) to support Soldier Protection System (SPS) requirements for lighter-weight ballistic materials with improved performance and manufacturing/ testing process improvements. If new materials are ready, the Product Management Office will evaluate upgrades and inform stakeholders of new operational capabilities and then incorporate them into SPS designs as appropriate. Continue efforts to characterize and increase durability, shelf life, and functional service life of existing personal protective systems at the subsystem/component level. Product office will Continue the development of improved measurement processes for existing systems and emerging requirements.			
<b>FY 2022 Plans:</b> Project will continue Technology/Maturation and Risk Reduction efforts across the PPE portfolio: Torso and Extremity Protection (TEP); Vital Torso Protection (VTP); Integrated Head Protection System (IHPS); Next Generation (NG) IHPS, and Military Protective Eyewear Systems to support SPS requirements for lighter-weight ballistic materials with improved performance and manufacturing/ testing process improvements. When new materials are ready, the Product Management Office will evaluate upgrades and inform stakeholders of new operational capabilities and then incorporate them into SPS designs as appropriate. Continue efforts to characterize and increase durability, shelf life, and functional service life of existing personal protective systems at the subsystem/component level. Continue the development of improved measurement processes for existing systems and			

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603827A / <i>Soldier Systems - Advanced Development</i>	<b>Project (Number/Name)</b> VS4 / <i>Soldier Protective Equipment</i>

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
emerging requirements. Continue Head Protection efforts to pursue Durable Anti-fog Coatings for Combat Eye Protection and Transparent Surfaces, Lightweight Composite Hybrid Rifle Helmet, and Next Generation Blunt Impact Test Methods supporting the Secretary of the Army's directive to identify opportunities for commonality across all Services (Army, Navy, Air Force, Marines, and Coast Guard). Product office will begin efforts to update gender geometric anatomy into models, such as Operational Requirements-based Casualty Assessment, to inform designs, sizing, and variations development and improvements to support Department of Defense (DoD) Soldier protection needs.  <b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> Funding change in Soldier Protective Equipment portfolio is due to anticipated requirement changes in Fiscal (FY) 2021 and FY 2022 that result in an increase level of effort to address emerging threats.			
<b>Accomplishments/Planned Programs Subtotals</b>	2.720	2.279	4.278

<b>C. Other Program Funding Summary (\$ in Millions)</b>											
<b>Line Item</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022 Base</b>	<b>FY 2022 OCO</b>	<b>FY 2022 Total</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>FY 2026</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
• VS5: <i>Soldier Protective Equipment</i>	6.355	6.478	9.172	-	9.172	-	-	-	-	-	-

**Remarks**

**D. Acquisition Strategy**

Programs pursue technology transition from science and technology, maturation, and prototype development, culminating in the transition of mature technologies (Technology Readiness Levels (TRL) 6-7) to Engineering and Manufacturing Development. This Project continues to exercise competitively awarded contracts using best value source selection procedures where applicable.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army												Date: May 2021				
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)								
2040 / 4				PE 0603827A / Soldier Systems - Advanced Development				VS4 / Soldier Protective Equipment								
<b>Management Services (\$ in Millions)</b>				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total				
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract	
Program Management Support	Allot	PM SSV Various : Various	3.146	0.300		0.482		0.954		-		0.954	Continuing	Continuing	Continuing	
<b>Subtotal</b>			3.146	0.300		0.482		0.954		-		0.954	Continuing	Continuing	N/A	
<b>Product Development (\$ in Millions)</b>				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total				
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract	
Dev/Sys Engineering Spt	MIPR	Various : Various	8.902	0.750		0.300		0.500		-		0.500	Continuing	Continuing	Continuing	
Dev/Integ Contracts	TBD	Various : Various	77.777	1.184		1.147		2.190		-		2.190	Continuing	Continuing	Continuing	
<b>Subtotal</b>			86.679	1.934		1.447		2.690		-		2.690	Continuing	Continuing	N/A	
<b>Support (\$ in Millions)</b>				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total				
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract	
Misc Support Costs	MIPR	Various : Various	5.421	-		-		-		-		-	Continuing	Continuing	Continuing	
<b>Subtotal</b>			5.421	-		-		-		-		-	Continuing	Continuing	N/A	
<b>Test and Evaluation (\$ in Millions)</b>				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total				
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract	
Ballistic/Blast/Nonballistic Testing	MIPR	Various : Various	18.695	0.486		0.350		0.634		-		0.634	Continuing	Continuing	Continuing	
<b>Subtotal</b>			18.695	0.486		0.350		0.634		-		0.634	Continuing	Continuing	N/A	
<b>Project Cost Totals</b>			113.941	2.720		2.279		4.278		-		4.278	Continuing	Continuing	N/A	

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<b>Exhibit R-3, RDT&amp;E Project Cost Analysis: PB 2022 Army</b>							<b>Date: May 2021</b>			
<b>Appropriation/Budget Activity</b> 2040 / 4			<b>R-1 Program Element (Number/Name)</b> PE 0603827A / <i>Soldier Systems - Advanced Development</i>			<b>Project (Number/Name)</b> VS4 / <i>Soldier Protective Equipment</i>				
	<b>Prior Years</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022 Base</b>	<b>FY 2022 OCO</b>	<b>FY 2022 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>	

Remarks

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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2022 Army</b>		<b>Date: May 2021</b>
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603827A / <i>Soldier Systems - Advanced Development</i>	<b>Project (Number/Name)</b> VS4 / <i>Soldier Protective Equipment</i>

Event Name	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
SPS Technology Upgrade Insertion	[Redacted]																											
VTP LRIP Production	[Redacted]																											
VTP FRP Decision	[Redacted]																											
VTP Technology Upgrade Insertion	[Redacted]																											
TEP Technology Upgrade Insertion	[Redacted]																											
MCEP Improvement	[Redacted]																											
Next Gen IHPS Production	[Redacted]																											
Helmet Technology Upgrade Insertion	[Redacted]																											
Lightweight Composite Hybrid Rifle Helmet	[Redacted]																											
Next Generation Blunt Impact Test Method	[Redacted]																											

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<b>Exhibit R-4A, RDT&amp;E Schedule Details: PB 2022 Army</b>		<b>Date: May 2021</b>
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603827A / <i>Soldier Systems - Advanced Development</i>	<b>Project (Number/Name)</b> VS4 / <i>Soldier Protective Equipment</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
SPS Technology Upgrade Insertion	1	2018	4	2026
VTP LRIP Production	1	2020	1	2025
VTP FRP Decision	1	2021	1	2021
VTP Technology Upgrade Insertion	1	2021	4	2026
TEP Technology Upgrade Insertion	1	2021	4	2026
MCEP Improvement	1	2022	4	2026
Next Gen IHPS Production	2	2021	4	2025
Helmet Technology Upgrade Insertion	1	2021	4	2026
Lightweight Composite Hybrid Rifle Helmet	1	2022	4	2022
Next Generation Blunt Impact Test Method	1	2022	4	2022

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**Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Army** **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040: <i>Research, Development, Test &amp; Evaluation, Army / BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0604017A / <i>Robotics Development</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	-	80.909	95.367	87.198	-	87.198	-	-	-	-	-	-
CF4: <i>Robotic Combat Vehicle (RCV) NGCV-CFT</i>	-	75.326	89.281	84.450	-	84.450	-	-	-	-	-	-
FD2: <i>Soldier Robotics Systems</i>	-	2.657	3.138	-	-	-	-	-	-	-	-	-
FD9: <i>Robotics Systems</i>	-	2.926	2.948	2.748	-	2.748	-	-	-	-	-	-

**Note**

For Project FD2 Soldier Robotics Systems, the primary program funded in Fiscal Year (FY) 2021 was Enhanced Robotic Payloads which has a new FY 2022 Program of Record (POR) line under Program Element (PE) 0605053A Project BS9 Robotic Payloads.

**A. Mission Description and Budget Item Justification**

The Robotic Combat Vehicle (RCV) Prototyping effort will produce unmanned combat vehicle prototypes with the purpose of providing prototypes that Soldiers will use to develop new Concepts of Operations (CONOPS) and new requirements to support Army Modernization priorities. RCV efforts will be executed in three (3) phases focused on increasing the complexity of RCV Soldier maneuvers and expanding prototype platform capability. These efforts will inform the Army's decision to initiate Robotic Combat Vehicle program(s) of record transitioning from Technology Demonstrations through Modeling and Simulation (M&S) development, prototype testing and iterative Soldier evaluations. This will stress technologies developed within the Science and Technology (S&T) base, assist the Next Generation Combat Vehicles Cross Functional Team (NGCV CFT) with refining RCV requirements, and develop the CONOPS and Tactics, Techniques and Procedures (TTPs) for Manned / Unmanned Teaming (MUM-T) in combat relevant missions. This program supports the Next Generation Combat Vehicle Cross Functional Team.

Soldier Robotics Systems for Robotics Development (RD) improves robotic and autonomous program acquisition schedules by supporting the development of integrated and synchronized capability documents (e.g. Joint Capabilities Integration and Development System, Department Directed, etc.) and by maturing/transitioning technology. Activities include studies, assessments, and document development such as Technology Readiness Levels, Manufacturing Readiness Levels, Analysis of Alternatives/Letter of Sufficiency determinations, draft acquisition documents, and draft contract documents. Efforts include robotics and autonomous systems technology maturation/transition from S&T projects, Milestone Decision Documentation (MDD), and activities leading up to formal program initiation at Milestone B or C. The pre-acquisition activities conducted under this line intend to reduce acquisition cost, schedule, and performance risk by conducting market surveys, technical risk assessments, developing performance specifications, scopes of work, acquisition strategies, systems engineering plans, test and evaluation master plans, lifecycle sustainment plans, engaging in early test planning, and prototype development activities. This line is for robotic systems that are transported by vehicle and maneuver under their own power.

The Battery Modernization & Interface Standardization (BMIS) program was established to help bring greater power efficiency and effectiveness to the dismounted Soldier and reduce the proliferation of proprietary batteries across the Army. BMIS will develop the Army Standard Family of Batteries (SFoB), a central acquisition management authority, and reduce 38 Communications-Electronics (C-E) battery types, currently in use, to just 3. Battery standardization and policy enforcement will



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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040: <i>Research, Development, Test &amp; Evaluation, Army / BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0604017A / <i>Robotics Development</i>	
<p>support Operational Readiness at a reduced cost to the Army while maintaining configuration management, life cycle support, safety standards, and technological upgrades.</p> <p>Program Office Robotics Development (RD) improves robotic and autonomous program acquisition schedules by supporting the development of integrated and synchronized capability documents (e.g. Joint Capabilities Integration and Development System (JCIDS), Department Directed, etc.) and by maturing/transitioning technology. Activities include studies, assessments, and document development such as Technology Readiness Levels, Manufacturing Readiness Levels, Analysis of Alternatives/Letter of Sufficiency determinations, market research, draft acquisition documents, and draft contract documents. Efforts include robotics and autonomous systems technology maturation/transition from S&amp;T projects, MDD, and activities leading up to formal program initiation at Milestone B or C. The pre-acquisition activities conducted under this line intend to reduce acquisition cost, schedule, and performance risk by conducting market surveys, technical risk assessments, developing performance specifications, scopes of work, acquisition strategies, systems engineering plans, test and evaluation master plans, lifecycle sustainment plans, engaging in early test planning, and prototype development activities. This line is for large robotic systems that are transported by vehicle, maneuver under their own power, or are installed as robotic applique kits. Research Development Technology Evaluation (RDTE) funds enable support to capability development of emerging requirements. Funds prepare these capabilities for entrance into the Defense Acquisition System (i.e. Milestone decision). Program Office Robotics RDTE funding supports Leader Follower and Assault Breacher Vehicle (ABV) program transitions from Technology Demonstrations to Program of Record through Modeling and Simulation (M&amp;S) development and initial prototype testing. This will stress the autonomy systems and ultimately reduce Program of Record testing requirements, technical risks, and costs through studies and validated simulations. Funding also supports the exploration and development of Expedient Leader Follower (ExLF) Applique on additional systems (Heavy Expanded Mobility Tactical Truck (HEMTT), Family of Medium Tactical Vehicles (FMTV), and 915 truck fleets) beyond the Palletized Load System (PLS) and applique kits on existing Tactical Wheeled Vehicles. Funding supports Program management activities including inter-service support, travel, conducting Analysis of Alternatives (AoA), draft performance specifications, prototype demos, acquisition documents, payload demos, future payload maturation for Robotic Platforms and support for Enhanced Robotic Payloads (ERP) programs, Chemical Biological Radiological and Nuclear (CBRN), Common Robotic System Light Reconnaissance Robot (LRR) (CRS(LR)), and future robotic platforms.</p> <p>Funding also supports modernization of the current Ground Robotic fleets and current Army vehicles by investigating technology insertions including, but not limited to: condition based maintenance, vetronics, Robotic Architecture, autonomous operations and other emerging technologies. Funding will also support developing initial prototypes to enable refinement of Operational Requirements and early user feedback to support future sustainment and operational movement operating concepts.</p>		

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2022 Army	<b>Date:</b> May 2021
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<b>Appropriation/Budget Activity</b> 2040: <i>Research, Development, Test &amp; Evaluation, Army / BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0604017A / <i>Robotics Development</i>
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<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022 Base</b>	<b>FY 2022 OCO</b>	<b>FY 2022 Total</b>
Previous President's Budget	84.381	121.207	144.629	-	144.629
Current President's Budget	80.909	95.367	87.198	-	87.198
Total Adjustments	-3.472	-25.840	-57.431	-	-57.431
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-21.415			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-3.472	-4.425			
• Adjustments to Budget Years	-	-	-57.431	-	-57.431

**Change Summary Explanation**

The decrease in funding from FY 2021 to FY 2022 is due to a realignment of funding and change in strategy.

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army										<b>Date:</b> May 2021		
<b>Appropriation/Budget Activity</b> 2040 / 4					<b>R-1 Program Element (Number/Name)</b> PE 0604017A / <i>Robotics Development</i>				<b>Project (Number/Name)</b> CF4 / <i>Robotic Combat Vehicle (RCV) NGCV-CFT</i>			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022 Base</b>	<b>FY 2022 OCO</b>	<b>FY 2022 Total</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>FY 2026</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
CF4: <i>Robotic Combat Vehicle (RCV) NGCV-CFT</i>	-	75.326	89.281	84.450	-	84.450	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

The Robotic Combat Vehicle (RCV) Prototyping effort will produce unmanned combat vehicle prototypes with the purpose of providing prototypes that Soldiers will use to develop new Concepts of Operations (CONOPS) and new requirements to support Army Modernization priorities. RCV efforts will be executed in three (3) phases focused on increasing the complexity of RCV Soldier maneuvers and expanding prototype platform capability. These efforts will inform the Army's decision to initiate Robotic Combat Vehicle program(s) of record transitioning from Technology Demonstrations through Modeling and Simulation (M&S) development, prototype testing and iterative Soldier evaluations. This will stress technologies developed within the Science and Technology (S&T) base, assist the Next Generation Combat Vehicles Cross Functional Team (NGCV CFT) with refining RCV requirements, and develop the CONOPS and Tactics, Techniques and Procedures (TTPs) for Manned / Unmanned Teaming (MUM-T) in combat relevant missions.

In order to accelerate user involvement with RCV platform capabilities, an RCV Prototyping effort will be executed through a three (3) phase activity. This project will finalize Phase 1's rapid prototype build of surrogate RCV platforms using existing robotized vehicles and conduct Soldier MUM-T evaluations at the platoon level (4 RCVs). In order to conduct larger scale MUM-T maneuvers and to continue to advance the autonomous performance of the robotic platforms, two additional platoons of RCVs (8 RCVs) will be built (Phase 2) leveraging existing contractor unmanned platforms for a total of a company set (12) RCVs. The company of RCVs will be used for Soldier experimentation building off of Phase 1 and providing additional refinement of CONOPS/TTPs.

The RCV Phase 3 prototyping will incorporate lessons learned and develop, modify and/or produce innovative, unmanned platforms. Phase 3 efforts will integrate modular mission payloads for RCVs that investigate different approaches to solving operational challenges and build on opportunities from Phases 1 and 2. The RCV platforms will integrate and mature capabilities transitioned from S&T to include the latest autonomous mobility capability, improved user control interfaces and advanced sensing and aided target detection and recognition (AiTDR). The Phase 3 RCV platform requirements will be informed by the initial platoon and company experimentation and Soldier feedback.

This program supports the Next Generation Combat Vehicle Cross Functional Team.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
<b>Title:</b> Prototype Platforms	46.865	38.812	14.261
<b>Description:</b> RCV - Prototype Platforms effort will produce unmanned combat vehicle prototypes with the purpose of creating an experimental unit set that Soldiers will use to create new CONOPS and new requirements for unmanned combat vehicles to support Army Modernization priorities. Several variants of prototypes will be created, starting first with surrogate platforms which			

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army		<b>Date:</b> May 2021		
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604017A / <i>Robotics Development</i>	<b>Project (Number/Name)</b> CF4 / <i>Robotic Combat Vehicle (RCV) NGCV-CFT</i>		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
<p>adapt existing platforms into surrogate RCVs for early experimentation in several different weight classes. Based off of lessons learned from the surrogate vehicle builds, platforms optimized to be RCVs will be built which maximize the capability advantages that unmanned platforms can offer such as reduced platform size and weight. The platforms will be built with the purpose of going through Army Test &amp; Evaluation Center (ATEC) safety release and ultimately for Soldier evaluation through iterative User experimentation.</p> <p><b>FY 2021 Plans:</b> Phase 2 light and medium RCV prototype integration of autonomy software, sensors, and lethality systems, delivering prototypes for test and evaluation will be completed. This will transition updated AiTDR and autonomous navigation algorithms to Phase 1 and Phase 2 surrogate systems for Phase 2 experimentation. The concept and detailed design of the Phase 3 RCV prototypes will begin and as well as the fabrication and purchase of long-lead components and sub-systems including powertrain, energy storage, sensors, and lethality systems. Phase 3 prototype platforms will focus on decisive lethality mission roles, will be designed for remote operation and the integration of direct fire, missile systems and advanced sensors. Remote control software for modular mission packages including obscuration, electronic warfare, counter unmanned aerial systems, chemical-biological and other reconnaissance sensors will be matured and integrated.</p> <p><b>FY 2022 Plans:</b> Cost includes hardware kits for the RCV platforms. To include integration costs for CROWS-J, XM813, MCT-30, obscuration, amphibious kits, marsupial unmanned system, electronic warfare, counter Unmanned Aerial System (UAS), and chemical-biological sensors. This also includes physical and software design changes required from Soldier touchpoint feedback to include in SOE2.</p> <p><b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> The decrease from FY 2021 to FY 2022 is due to a further breakdown of costs and a change in Phase 3.</p>				
<p><b>Title:</b> Modeling and Simulation</p> <p><b>Description:</b> RCV Modeling and Simulation effort will produce the ability to experiment in a virtual environment to conduct data collection and results that will inform the physical testing learning objectives. This will provide the initial data set to inform the operational experimentation in the RCV Campaign of Learning as well as feed initial data to the Requirements Community as they build new MUM-T, CONOPs and TTPs. As test data is collected, high fidelity simulations for unmanned operation of combat platforms will be refined in a virtual test environment to enable virtual test - fix - test cycles in a virtual developmental space.</p> <p><b>FY 2021 Plans:</b> This effort will continue the series of virtual experiments for Phase 3 RCV concepts, evaluating initial designs that factor in the mobility, lethality, and AiTDR capabilities using accurate technology models simulated in an operational environment and tested</p>		4.092	3.195	12.102

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army		<b>Date:</b> May 2021		
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604017A / <i>Robotics Development</i>	<b>Project (Number/Name)</b> CF4 / <i>Robotic Combat Vehicle (RCV)</i> NGCV-CFT		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
with trained Soldiers to provide a RCV understanding for future BCT formations. The models will inform Soldier Operational Experiments and the TTPs employed.  <b>FY 2022 Plans:</b> Modeling and simulation costs include conducting virtual experiments and BOIP development. These costs also include systems integration labs (SIL), personnel support, virtual experimentation support to include expansion to company-level scale, concept modeling and analytics. The models will inform the Soldier Operational Experiments and the TTPs employed.  <b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> The increase in costs from FY 2021 to FY 2022 includes efforts to increase the fidelity and accuracy of simulated environments and systems, as well as an increase to the number of virtual experiments.				
<b>Title:</b> Testing and Evaluation  <b>Description:</b> RCV Testing effort will perform system verification testing and system safety testing on the RCV surrogate platforms and purpose-built prototypes. This will expose unexpected issues and ensure that the RCV systems are safe for Soldier operation prior to conducting Field Experimentation.  <b>FY 2021 Plans:</b> Phase 2 platforms will conduct system verification testing and go through a full range of shakedown tests to ensure platforms are ready to begin safety testing. Shakedown testing will incorporate platform, section, platoon, and company level validation testing prior to transition to the Army Test and Evaluation Command for safety testing.  <b>FY 2022 Plans:</b> RCV system shakedown testing will finish and then all platforms will conduct safety release testing at Army Test and Evaluation Command to begin the evaluation process for a Safety Release for Soldier use of the RCV vehicles. Upon completion of safety testing at ATEC, all platforms will transition to conduct the Phase 2 Soldier Operational Experiment with Soldiers in a relevant operational environment. Test and evaluation costs include system-of-system level testing of autonomy system across platforms, ATEC safety testing, test engineering support, operational experimentation planning and training, and FSR support for shakeout and experimentation efforts. These costs also include OPTEMPO costs for facilities and fuel.  <b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> The decrease in costs from FY 2021 to FY 2022 are due to the transition into the evaluation process.		5.606	16.649	12.117
<b>Title:</b> Program Management  <b>Description:</b> RCV Program Management effort will enable RCV concept development, modeling and simulation, detailed design, system integration and build, testing, and all Manned Unmanned Teaming Field Experimentation.		5.954	8.117	7.545

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604017A / <i>Robotics Development</i>	<b>Project (Number/Name)</b> CF4 / <i>Robotic Combat Vehicle (RCV)</i> NGCV-CFT

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
<p><b><i>FY 2021 Plans:</i></b> Funding supports the Program Management Office (PMO) acquisition, development of the request for proposal, and initiation of milestone documentation. This funding also includes risk assessment, mitigation efforts, contract preparation, industry analysis, and feedback sessions, to include government and contractor labor, travel, supplies, equipment and facilities. This will also manage detailed design, build, integration, and evaluation of the RCV platform solutions and the execution of the Phase 2 testing and Phase 3 systems engineering, design and integration.</p> <p><b><i>FY 2022 Plans:</i></b> Program management support costs include program planning, matrix support, SETA contractors and government systems engineering. These costs include contract preparation and milestone documentation. This funding also includes risk assessment, mitigation efforts, contract preparation, industry analysis, and feedback sessions, to include government and contractor labor, travel, supplies, equipment and facilities. This will also manage Phase 2 testing and operational experimentation and Phase 3 design, build, and integration.</p> <p><b><i>FY 2021 to FY 2022 Increase/Decrease Statement:</i></b> The decreased in costs from FY 2021 to FY 2022 is due to the decrease in manpower required to manage a shift in the effort from design, build, and integration to testing and evaluation.</p>			
<p><b><i>Title:</i></b> Other Support Costs</p> <p><b><i>Description:</i></b> Other support costs include industry analysis and feedback sessions, risk assessment and mitigation efforts, and PEO shared expenses.</p> <p><b><i>FY 2021 Plans:</i></b> Other support costs include the industry analysis and feedback sessions, risk assessment and mitigation efforts, and PEO shared expenses.</p> <p><b><i>FY 2022 Plans:</i></b> Other support costs include the SSEB for development contract(s), industry analysis and feedback sessions, risk assessment and mitigation efforts, initial logistics data and product development, PEO shared expenses, and the development of the RCV(L) AoA.</p> <p><b><i>FY 2021 to FY 2022 Increase/Decrease Statement:</i></b> The increase in cost from FY 2021 to FY 2022 is due to the breakout of costs from prototype platforms for greater transparency of costs.</p>	5.163	5.785	21.820
<p><b><i>Title:</i></b> Development Engineering</p>	7.646	16.723	16.605

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604017A / <i>Robotics Development</i>	<b>Project (Number/Name)</b> CF4 / <i>Robotic Combat Vehicle (RCV)</i> NGCV-CFT

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
<p><b>Description:</b> Development engineering costs include various engineering and software developments for the Robotic Combat Vehicles (RCV).</p> <p><b>FY 2021 Plans:</b> Costs include Safety engineering, actuation engineering, control improvements, perception improvements, autonomy software support, and VEA support.</p> <p><b>FY 2022 Plans:</b> Development engineering costs include government support of safety engineering program, by-wire kit development, emergency stop maturation, autonomy software support, autonomy architecture, autonomy software maturation, Warfighter Machine Interface (WMI) software maturation, architectural products and support for inter-operability profile (IOP) installation update for modular mission payloads, autonomous capability transition, perception improvements, human-robot interaction (HRI) and manned-unmanned teaming (MUM-T) control improvements. Development of system payload control software that includes targeting gimbals, unmanned aerial vehicle (UAV), marsupial unmanned ground vehicle (UGV), lethality systems and nonrecurring engineering for autonomy. Improvements to video management software and system latency reductions.</p> <p><b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> The decrease in cost from FY 2021 to FY 2022 is due to the breakout of costs from prototype platforms for greater transparency of costs.</p>			
<b>Accomplishments/Planned Programs Subtotals</b>	75.326	89.281	84.450

**C. Other Program Funding Summary (\$ in Millions)**  
N/A

**Remarks**  
In FY 2022, funding in the amount of \$0.365 million for manpower was realigned to Operations and Maintenance. Program support costs have been accurately updated to reflect the realignments.

**D. Acquisition Strategy**  
The RCV program will provide unmanned combat vehicles to enable Soldiers to assess the capability of the platforms and create new CONOPS and doctrine for manned/unmanned teaming based operations. Prototyping and experimentation efforts will inform new ways to fight, identify system limitations and benefits, mature key technologies, and reduce technical risk. The RCV program will provide an analytically backed basis for future RCV requirements documents that will drive and inform RCV programs of record.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army												Date: May 2021			
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)							
2040 / 4				PE 0604017A / Robotics Development				CF4 / Robotic Combat Vehicle (RCV) NGCV-CFT							
Management Services (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Management	MIPR	Various : Various	-	5.954	Oct 2019	8.117	Mar 2021	7.545	Mar 2022	-		7.545	Continuing	Continuing	Continuing
<b>Subtotal</b>			-	5.954		8.117		7.545		-		7.545	Continuing	Continuing	N/A
Product Development (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Development Engineering	TBD	TBD : TBD	-	7.646	Feb 2020	16.723	May 2021	16.605	Jun 2022	-		16.605	Continuing	Continuing	Continuing
Prototype Manufacturing	TBD	TBD : TBD	-	46.865	Jun 2020	38.812	Jun 2021	14.261	Jun 2022	-		14.261	Continuing	Continuing	Continuing
<b>Subtotal</b>			-	54.511		55.535		30.866		-		30.866	Continuing	Continuing	N/A
Support (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Other Support Costs	TBD	TBD : TBD	-	5.163	Apr 2020	5.785	Jun 2021	21.820	Jun 2022	-		21.820	Continuing	Continuing	Continuing
<b>Subtotal</b>			-	5.163		5.785		21.820		-		21.820	Continuing	Continuing	N/A
Test and Evaluation (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Modeling and Simulation	MIPR	TBD : TBD	-	4.092	Dec 2019	3.195	Dec 2020	12.102	Jun 2022	-		12.102	Continuing	Continuing	Continuing
Test and Evaluation	MIPR	TBD : TBD	-	5.606	Oct 2019	16.649	Dec 2020	12.117	Jun 2022	-		12.117	Continuing	Continuing	Continuing
<b>Subtotal</b>			-	9.698		19.844		24.219		-		24.219	Continuing	Continuing	N/A
Project Cost Totals			Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract				
<b>Project Cost Totals</b>			-	75.326	89.281	84.450	-	84.450	Continuing	Continuing	N/A				



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<b>Exhibit R-3, RDT&amp;E Project Cost Analysis:</b> PB 2022 Army							<b>Date:</b> May 2021			
<b>Appropriation/Budget Activity</b> 2040 / 4			<b>R-1 Program Element (Number/Name)</b> PE 0604017A / <i>Robotics Development</i>			<b>Project (Number/Name)</b> CF4 / <i>Robotic Combat Vehicle (RCV)</i> NGCV-CFT				
	<b>Prior Years</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022 Base</b>	<b>FY 2022 OCO</b>	<b>FY 2022 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>	

**Remarks**

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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2022 Army</b>		<b>Date: May 2021</b>
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604017A / <i>Robotics Development</i>	<b>Project (Number/Name)</b> CF4 / <i>Robotic Combat Vehicle (RCV)</i> NGCV-CFT

Event Name	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026																																																																																			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4																																																																																
RCV Phase 2 - ATEC Safety Testing									Safety Testing																																																																																																			
RCV Phase 2 – Soldier Operational Experiment																					SOE																																																																																							
RCV Phase 3A - Soldier Operational Experiment Integration & System Improvements																													SOE Integration & System Impr.																																																																															
RCV (L) Draft Request for Proposal																																					1 Draft RFP																																																																							
RCV (L) Analysis of Alternatives																																													2 AoA																																																															
RCV (L) AROC & CDD Validation																																																					3 AROC & CDD Validation																																																							
RCV (L) Milestone B																																																																	4 MS B																																											
RCV (L) Milestone C																																																																																	9 MS C																											
RCV (M) Draft Request for Proposal																																																																																									5 Draft RFP																			
RCV (M) Analysis of Alternatives																																																																																																	6 AoA											
RCV (M) AROC & CDD Validation																																																																																																									7 AROC & CDD Validation			
RCV (M) Milestone B																																																																																																												

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604017A / <i>Robotics Development</i>	<b>Project (Number/Name)</b> CF4 / <i>Robotic Combat Vehicle (RCV)</i> NGCV-CFT

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
RCV Phase 2 - ATEC Safety Testing	1	2022	2	2022
RCV Phase 2 ? Soldier Operational Experiment	3	2022	4	2022
RCV Phase 3A - Soldier Operational Experiment Integration & System Improvements	3	2022	2	2023
RCV (L) Draft Request for Proposal	2	2022	2	2022
RCV (L) Analysis of Alternatives	4	2022	4	2022
RCV (L) AROC & CDD Validation	4	2022	4	2022
RCV (L) Milestone B	2	2023	2	2023
RCV (L) Milestone C	3	2026	3	2026
RCV (M) Draft Request for Proposal	3	2023	3	2023
RCV (M) Analysis of Alternatives	1	2024	1	2024
RCV (M) AROC & CDD Validation	2	2024	2	2024
RCV (M) Milestone B	3	2024	3	2024
RCV (M) Milestone C	3	2028	3	2028

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army										<b>Date:</b> May 2021		
<b>Appropriation/Budget Activity</b> 2040 / 4					<b>R-1 Program Element (Number/Name)</b> PE 0604017A / <i>Robotics Development</i>				<b>Project (Number/Name)</b> FD2 / <i>Soldier Robotics Systems</i>			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022 Base</b>	<b>FY 2022 OCO</b>	<b>FY 2022 Total</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>FY 2026</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
FD2: <i>Soldier Robotics Systems</i>	-	2.657	3.138	-	-	-	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**Note**

For Project FD2 Soldier Robotics Systems, the primary program funded in Fiscal Year (FY) 2021 was Enhanced Robotic Payloads which has a new FY 2022 Program of Record (POR) line under Program Element (PE) 0605053A Project BS9 Robotic Payloads.

**A. Mission Description and Budget Item Justification**

Soldier Robotics Systems for Robotics Development (RD) improves robotic and autonomous program acquisition schedules by supporting the development of integrated and synchronized capability documents (e.g. Joint Capabilities Integration and Development System (JCIDS), Department Directed, Robotic & Autonomous Strategy (RAS), etc.) and by maturing/transitioning technology. Activities include studies, assessments, and document development such as Technology Readiness Levels, Manufacturing Readiness Levels, Analysis of Alternatives/Letter of Sufficiency determinations, draft acquisition documents, and draft contract documents. Efforts include robotics and autonomous systems technology maturation/transition from Science & Technology (S&T) demonstration projects, Milestone Decision Documentation (MDD), and activities leading up to formal program initiation at Milestone B or C. The pre-acquisition activities conducted under this line intend to reduce acquisition cost, schedule, and performance risk by conducting market surveys, technical risk assessments, developing performance specifications, scopes of work, acquisition strategies, systems engineering plans, test and evaluation master plans, lifecycle sustainment plans, engaging in early test planning, and prototype development activities. This line is for robotic systems that are transported by vehicle and maneuver under their own power. Funding supports modernization of the current Ground Robotic fleets by investigating technology insertions including, but not limited to: condition based maintenance, vetronics, Robotic Architecture, autonomous operations and other emerging technologies. Funding also supports developing initial prototypes to enable refinement of Operational Requirements and early user feedback to support future sustainment and operational movement operating concepts.

Funding supports modernization of the current Ground Robotic fleets by investigating technology insertions including, but not limited to: condition based maintenance, vetronics, Robotic Architecture, autonomous operations and other emerging technologies. Funding also supports developing initial prototypes to enable refinement of Operational Requirements and early user feedback to support future sustainment and operational movement operating concepts.

For Project FD2 Soldier Robotics Systems, the primary program funded in FY 2021 was Enhanced Robotic Payloads which has a new FY 2022 POR line under PE 0605053A Project BS9 Robotic Payloads.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
<b>Title:</b> Soldier Borne Sensor (SBS) / Exoskeleton	1.450	1.475	-
<b>Description:</b> The SBS provides the small unit a "quick look" capability with improved Situational Awareness of routes, buildings, tunnels, obstacles blocking line of sight, and similar concealed threat locations. The budget activity enables payload improvements including camera enhancements, target identification algorithms, display/controller improvements and user			

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army		<b>Date:</b> May 2021		
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604017A / <i>Robotics Development</i>	<b>Project (Number/Name)</b> FD2 / <i>Soldier Robotics Systems</i>		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
<p>notifications for specific items of interest. Soldier Exoskeleton variants, ranging from Commercial-Off-The-Shelf solutions, will be capable of operating in a wide range of environments enhancing combat operations.</p> <p><b>FY 2021 Plans:</b> Will continue to provide for the transitioning and continuing development of Industry and DoD efforts to augment the warfighter strengths and human performance to reduce Soldier load into a program of record. Evaluate potential exoskeleton solutions to refine operational requirements to inform capability requirement generation, Analysis of Alternatives and technical risk assessments to engage in early Soldier evaluations/feedback to reduce acquisition cost, schedule, and performance risk. Conduct key pre-acquisition activities to include initial document development such as; draft performance specifications, draft acquisition documents and draft contract documents and early development activities.</p> <p><b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> There is no funding in FY22 for this program. For Project FD2 Soldier Robotics Systems, the primary program funded in FY 2021 was Enhanced Robotic Payloads which has a new FY 2022 POR line under PE 0605053A Project BS9 Robotic Payloads.</p>				
<p><b>Title:</b> Unmanned Ground Vehicle (UGV) Soldier Robotics Development</p> <p><b>Description:</b> Soldier Robotics Development is designed to facilitate the transition of robotics and autonomous systems technology into Programs of Record. It informs the acquisition process beforehand allowing the Maneuver Center of Excellence, Sustainment Center of Excellence, Maneuver Support Center of Excellence, and the Cyber Center of Excellence the ability to make integration decisions and affordability trades while writing requirements. Robotics Development will fund Common Robotics System (Vehicle), Common Robotic System (Light Reconnaissance) Robot (LRR) (CRS(LR)), Common Robotic System (Communication Link) (CRS(CL)), Common Robotic System (Mission Command/Artificial Intelligence) (CRS(MS/AI)), Render Safe - Sets, Kits and Outfits (RS-SKO), Enhanced Robotics Payload (ERP), payload technology maturation efforts, Chemical, Biological, Radiological, and Nuclear (CBRN); small, pocket sized, airborne sensors, etc.</p> <p><b>FY 2021 Plans:</b> Funding is provided for program management matrix support to include salaries and travel, draft performance specifications, acquisition documents, prototype demonstrations, technology maturation, request for proposal documentations and conduct Analysis of Alternatives (AoA) on Enhanced Robotic Payload (ERP) programs, Chemical, Biological, Radiological, and Nuclear (CBRN), Common Robotic System (Light Reconnaissance) Robot (LRR) (CRS(LR)), and payload technology maturation efforts.</p> <p><b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> There is no FY22 funding for this program. For Project FD2 Soldier Robotics Systems, the primary program funded in FY 2021 was Enhanced Robotic Payloads which has a new FY 2022 POR line under PE 0605053A Project BS9 Robotic Payloads.</p>		1.207	1.663	-
<b>Accomplishments/Planned Programs Subtotals</b>		2.657	3.138	-

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army	<b>Date:</b> May 2021
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<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604017A / <i>Robotics Development</i>	<b>Project (Number/Name)</b> FD2 / <i>Soldier Robotics Systems</i>
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**C. Other Program Funding Summary (\$ in Millions)**

<u>Line Item</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022</u> <u>Base</u>	<u>FY 2022</u> <u>OCO</u>	<u>FY 2022</u> <u>Total</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>FY 2026</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• W63798: <i>Soldier Borne Sensor (SBS)</i>	23.362	18.907	18.654	-	18.654	-	-	-	-	-	-

**Remarks**

There is no funding in FY22 for this program. For Project FD2 Soldier Robotics Systems, the primary program funded in FY 2021 was Enhanced Robotic Payloads which has a new FY 2022 POR line under PE 0605053A Project BS9 Robotic Payloads.

**D. Acquisition Strategy**

Soldier Robotics Systems will utilize a Robotics Development funding for internal systems engineering, requirements and architecture analysis, AoAs and Technology Readiness Assessments with S&T partners, technology maturation efforts, and studies and analysis in support of program initiation with industry.

Initial exoskeleton efforts will continue to assess Industry's and DoD emerging exoskeleton initiatives performance through Soldier demonstrations/feedback to inform capability requirement generation, technology maturation, studies and analysis to support acquisition activities leading to program initiation.

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army** **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604017A / <i>Robotics Development</i>	<b>Project (Number/Name)</b> FD2 / <i>Soldier Robotics Systems</i>
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<b>Management Services (\$ in Millions)</b>				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
UGV Program Management Support	MIPR	Multiple : Multiple	0.808	1.050	Oct 2019	0.380	Oct 2020	-		-		-	0.000	2.238	Continuing
SBS and Exoskeleton Program Management Support	Various	Various : Multiple	1.814	1.450	Mar 2020	1.520	Jul 2020	-		-		-	0.000	4.784	Continuing
<b>Subtotal</b>			2.622	2.500		1.900		-		-		-	0.000	7.022	N/A

<b>Product Development (\$ in Millions)</b>				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
AoA CRS(H)	MIPR	Multiple : Various	0.258	-		-		-		-		-	0.000	0.258	-
AoA ERP	MIPR	Multiple : Various	0.506	-		-		-		-		-	0.000	0.506	-
AoA CRS(LR)	MIPR	Multiple : Various	0.049	-		-		-		-		-	0.000	0.049	-
Capability Development Studies, Demonstration (payload)	Various	Various : Multiple	-	0.157	Dec 2019	-		-		-		-	0.000	0.157	-
JCAUS IOP V4	MIPR	ARDEC : Picatinny, NJ	0.050	-		-		-		-		-	0.000	0.050	-
FY 2019 SBIR /STTR Transfer	TBD	TBD : TBD	0.048	-		-		-		-		-	0.000	0.048	-
<b>Subtotal</b>			0.911	0.157		-		-		-		-	0.000	1.068	N/A

<b>Support (\$ in Millions)</b>				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Performance Spec Dev	MIPR	Various : Multiple	-	-		0.619	Feb 2021	-		-		-	0.000	0.619	-
RFP and Acq Documentation	MIPR	Various : Multiple	-	-		0.619	Apr 2021	-		-		-	0.000	0.619	-
<b>Subtotal</b>			-	-		1.238		-		-		-	0.000	1.238	N/A





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**Exhibit R-4, RDT&E Schedule Profile: PB 2022 Army** **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604017A / <i>Robotics Development</i>	<b>Project (Number/Name)</b> FD2 / <i>Soldier Robotics Systems</i>
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Event Name	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
UGV Robotics Development (ERP, CBRN, CRS-LR, etc.)																												
UGV																												
SBS Analysis of Alternatives / Letter of Sufficiency																												
AoA/LoS																												
SBS Market Survey																												
Market Survey																												
SBS Request for Proposal (Development/Staffing)																												
RFP (Development/Staffing)																												
SBS SSEB																												
SSEB																												
SBS Studies/Analysis																												
Study/Analysis																												
Exoskeleton Industry Demonstration & Analysis																												
Industry Demonstration & Analysis																												
Exoskeleton Market Survey / Request For Information																												
Market Survey /RFI																												
Exoskeleton Capability Requirement Analysis																												
AoA, CBA, C-BA																												
Exoskeleton Materiel Development Decision																												
UGV Robotics Development ERP Risk Reduction																												
UGV RD																												

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**Exhibit R-4A, RDT&E Schedule Details:** PB 2022 Army **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604017A / <i>Robotics Development</i>	<b>Project (Number/Name)</b> FD2 / <i>Soldier Robotics Systems</i>
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Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
UGV Robotics Development (ERP, CBRN, CRS-LR, etc.)	1	2018	4	2024
SBS MDD	1	2018	1	2018
SBS Analysis of Alternatives / Letter of Sufficiency	1	2018	4	2023
SBS Market Survey	1	2018	4	2023
SBS Request for Proposal (Development/Staffing)	1	2018	2	2024
SBS RFP Release Decision	2	2019	2	2019
SBS SSEB	3	2019	1	2020
SBS MS B/C	4	2019	4	2019
SBS Studies/Analysis	1	2018	4	2023
Exoskeleton Industry Demonstration & Analysis	1	2020	4	2021
Exoskeleton Market Survey / Request For Information	1	2021	4	2021
Exoskeleton Capability Requirement Analysis	1	2021	4	2021
Exoskeleton Materiel Development Decision	4	2021	4	2021
UGV Robotics Development ERP Risk Reduction	1	2020	4	2023

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army										<b>Date:</b> May 2021		
<b>Appropriation/Budget Activity</b> 2040 / 4					<b>R-1 Program Element (Number/Name)</b> PE 0604017A / <i>Robotics Development</i>				<b>Project (Number/Name)</b> FD9 / <i>Robotics Systems</i>			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022 Base</b>	<b>FY 2022 OCO</b>	<b>FY 2022 Total</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>FY 2026</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
FD9: <i>Robotics Systems</i>	-	2.926	2.948	2.748	-	2.748	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

Program Office Robotics Development (RD) improves robotic and autonomous program acquisition schedules by supporting the development of integrated and synchronized capability documents (e.g. JCIDS, Department Directed, etc.) and by maturing / transitioning technology. Research Development Technology Evaluation (RDTE) funds enable support to capability development of emerging requirements. Activities include studies, assessments, and document development such as Technology Readiness Levels, Manufacturing Readiness Levels, Analysis of Alternatives / Letter of Sufficiency determinations, draft acquisition documents, and draft contract documents. Efforts include robotics and autonomous systems technology maturation / transition from Science & Technology (S&T) projects and Robotic Enhancement Program (REP) initiatives, Milestone Decision Documentation (MDD), and activities leading up to formal program initiation at Milestone B or C. The pre-acquisition activities conducted under this line intend to reduce acquisition cost, schedule, and performance risk by conducting market surveys, technical risk assessments, developing performance specifications, scopes of work, acquisition strategies, systems engineering plans, test and evaluation master plans, lifecycle sustainment plans, engaging in early test planning, and prototype development activities. This line is for large robotic systems that are transported by vehicle, maneuver under their own power, or are installed as robotic applique kits.

Funding will expand Modeling and Simulation (M&S) including Continuous Autonomy Simulation Test Laboratory Environment (CASTLE) capability to test and evaluate Manned Unmanned teaming, combat scenarios or other emerging Robotics requirement needs. RD funding will utilize the M&S environment to mature and evaluate S&T for inclusion to program requirements, Engineering Change Proposals (ECPs) and/or technical insertions, utilize gaming technology in conjunction with Autonomy Software to develop Training, Tactics and Procedures (TTPs), requirements and Concepts of Operations (CONOPS). In addition, RD funds exploration and development of the Expedient Leader Follower (ExLF) Applique on additional systems (Heavy Expanded Mobility Tactical Truck (HEMTT), Family of Medium Tactical Vehicles (FMTV) and 915 truck fleets) beyond the Palletized Load System (PLS). Funding supports Program management activities including inter-service support, travel, conducting Analysis of Alternatives (AoA), draft performance specifications, prototype demos, acquisition documents, payload demos, future payload maturation for Robotic Platforms and support for Enhanced Robotic Payloads (ERP) programs, Chemical Biological Radiological and Nuclear (CBRN), Common Robotic System Light Reconnaissance Robot (LRR) (CRS(LR)), and future robotic platforms.

Funding also supports modernization of the current Ground Robotic fleets and current Army vehicles by investigating technology insertions including, but not limited to: condition based maintenance, vetronics, Robotic Architecture, autonomous operations and other emerging technologies. Funding will also support developing initial prototypes to enable refinement of Operational Requirements and early user feedback to support future sustainment and operational movement operating concepts.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
<b>Title:</b> Emerging Robotics Systems	2.926	2.948	2.748
<b>Description:</b> Validation and verification of incremental system software capability upgrades for emerging robotic requirements through M&S Software-in-the-loop (SIL) and Hardware-in-the-loop (HIL) allowing for transition into Program of Record.			

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army	<b>Date:</b> May 2021
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<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604017A / <i>Robotics Development</i>	<b>Project (Number/Name)</b> FD9 / <i>Robotics Systems</i>
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<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
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**FY 2021 Plans:**  
 FY 2021 funding will expand Modeling and Simulation including CASTLE capabilities to test and evaluate Manned Unmanned Teaming, combat scenarios or other emerging program needs. RD funding will utilize the M&S environment to mature and evaluate S&T for inclusion to program requirements, Engineering Change Proposals (ECPs) and/or technical insertions and various mission payload development, utilize gaming technology in conjunction with Autonomy Software to develop Training, Tactics and Procedures (TTPs), requirements and CONOPS and continue validating simulation scenarios to expand test capability. Funding will support Rapid prototyping to inform emerging programs with a Buy, Try, Decide strategy and to include Robotic Payloads. In addition, funds support the exploration and development of Expedient Leader Follower (ExLF) Applique on additional systems (Heavy Expanded Mobility Tactical Truck (HEMTT), Family of Medium Tactical Vehicles (FMTV) and 915 truck fleets) beyond the PLS and providing an autonomous capability to existing Army vehicles. Funds will be used to support maturation of autonomy Software and autonomous Architecture for various Robotic programs.

**FY 2022 Plans:**  
 FY 2022 funding will expand Modeling and Simulation including CASTLE capabilities to provide a Live/Virtual component. A Live/Virtual capability will allow for testing with fewer assets, increase the live testing safety space and expand current autonomous test capabilities for RAS programs. RD funding will utilize the CASTLE environment to mature and evaluate vendor technologies, autonomy software and payload software in support of Continuous Integration and/or Development to Operations (DEV/OPS) for RAS programs and to develop interfaces and profiles to support machine learning and AI training. RD funding will support necessary infrastructure to conduct Continuous Integration, DEV/OPS and data collection/mining necessary in lieu of an existing enterprise solution. RD funding will utilize gaming technology in conjunction with Autonomy Software to develop Training, Tactics and Procedures (TTPs), requirements and CONOPS and continue validating simulation scenarios to expand test capability. Funding will support Rapid prototyping to inform emerging requirements with a Buy, Try, Decide strategy and to include Robotic payloads. Funds will be used to support maturation of autonomy Software and autonomous Architecture for various Robotic programs. Funding may also include supporting PM activities to include drafting performance specs, prototype demos, acquisition document preparation, payload demonstrations, future payload maturation for Robotic platforms. Also Request for proposal documentation on Enhanced Robotic Payload (ERP) programs, Chemical Biological Radiological and Nuclear (CBRN), Common Robotic System (Light Reconnaissance) Robot (LRR) (CRS(LR)), and future robotic platforms.

**FY 2021 to FY 2022 Increase/Decrease Statement:**  
 Minimal increase from FY2020 to FY2021.

<b>Accomplishments/Planned Programs Subtotals</b>	2.926	2.948	2.748
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**C. Other Program Funding Summary (\$ in Millions)**  
 N/A

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604017A / <i>Robotics Development</i>	<b>Project (Number/Name)</b> FD9 / <i>Robotics Systems</i>

**C. Other Program Funding Summary (\$ in Millions)**

**Remarks**

Pre-acquisition program activities funded by this line transition to a separate Program Element and Project prior to their first program acquisition Milestone (B or C).

**D. Acquisition Strategy**

Robotics Development (RD) is designed to facilitate the transition of robotics and autonomous systems technology from Science and Technology (S&T) projects into programs of record. It informs the acquisition process early in the development cycle allowing key stakeholders the ability to make integration decisions and affordability trades while writing requirements.

The Program Office builds upon the CCDC GVSC Expedient Leader Follower (ExLF) Operational Technology Demonstration (OTD) to provide a limited autonomous vehicle capability to Tactical Wheeled Vehicles including the Palletized Load System (PLS) A1, Heavy Expanded Mobility Tactical Truck (HEMTT), Family of Medium Tactical Vehicle (FMTV). Efforts include Capabilities Document input, close analysis of OTD activities that feed cost estimates, capture technical and test data, provide test support, develop Modeling and Simulation (M&S) capabilities, and develop a Software Integration Lab (SIL). Efforts may support Rapid prototyping to inform emerging requirements and other Army systems. A "buy/lease, try and inform" methodology may be used to evaluate Commercial Off the Shelf (COTS), Government Off the Shelf (GOTS) and Non-Developmental Item (NDI) robotics products that have the potential to enhance Soldier combat effectiveness. Actual operational user feedback and evaluation results obtained will inform emerging capabilities and requirements documents in support of a return on investment to support future Army decision making.

Robotic Combat Vehicle (RCV) funding supports Systems Engineering, Requirements, Cost Analysis, Joint Capabilities Technology Demonstration (JCTD) support, and technology transition plans.

Combat Capabilities Development Command (CCDC) Ground Vehicle Systems Center (GVSC) funding allows the Army to demonstrate and operationally assess an unmanned vehicle capability with operational units and users to validate the technology. The Army will build, and test prototype systems for safety release, Soldier use, and further technology maturation.

Robotic Combat Vehicle (RCV) Experimental Unit Prototyping will provide unmanned combat vehicles to enable users to assess the capability of the platforms and created new CONOPS and doctrine for manned/unmanned teaming based operations. Efforts will inform new CONOPS, identified system limitations and benefits and provide an achievable, analytically backed basis for future RCV requirements documents to drive future acquisition programs.

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army** **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604017A / <i>Robotics Development</i>	<b>Project (Number/Name)</b> FD9 / <i>Robotics Systems</i>
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<b>Management Services (\$ in Millions)</b>				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
PM FP PdM ALUGS	Allot	PM FP : Warren, MI	3.375	0.848	Oct 2019	0.500	Oct 2019	0.500	Oct 2021	-		0.500	0.000	5.223	-
FY 2018 NDAA SEC 825 MDAP Cost Overrun	TBD	N/A : N/A	0.028	-		-		-		-		-	0.000	0.028	-
FY 2020 SBIR/STTR Transfer	TBD	Various : Various	-	0.139		-		-		-		-	0.000	0.139	-
<b>Subtotal</b>			3.403	0.987		0.500		0.500		-		0.500	0.000	5.390	N/A

<b>Product Development (\$ in Millions)</b>				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
RCV/ACO M&S SIL	MIPR	CCDC GVSC : Warren, MI	1.100	-		-		-		-		-	0.000	1.100	-
SMET Modular Mission Payloads	TBD	TBD : TBD	1.000	-		-		-		-		-	0.000	1.000	-
Leader Follower (CCDC GVSC) Tech Demo A Kit	C/CPFF	Robotic Research : Baltimore, MD	25.944	-		-		-		-		-	0.000	25.944	-
Leader Follower (CCDC GVSC) Tech Demo B Kit	C/CPFF	Oshkosh : Oshkosh, WI	21.423	-		-		-		-		-	0.000	21.423	-
Leader Follower (CCDC GVSC) Integrated System Integrator	C/CPFF	Lockheed Martin : Dallas, TX	7.699	-		-		-		-		-	0.000	7.699	-
Leader Follower (CCDC GVSC) Warfighter Machine Interface	C/CPFF	DCS Corp : Boston, MA	6.977	-		-		-		-		-	0.000	6.977	-
RCV Risk Reduction Platform Development (CCDC GVSC)	C/CPFF	To Be Determined : To Be Determined	18.540	-		-		-		-		-	0.000	18.540	-
RD M&S SIL	MIPR	CCDC GVSC and various : Warren, MI	-	0.800	Oct 2019	0.913	Jul 2020	1.483	Oct 2021	-		1.483	0.000	3.196	-
ABV RCS Safety Requirements, Visualization tool	TBD	GVSC : Warren, MI	-	0.175	Mar 2021	-		-		-		-	0.000	0.175	-

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army** **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604017A / <i>Robotics Development</i>	<b>Project (Number/Name)</b> FD9 / <i>Robotics Systems</i>
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<b>Product Development (\$ in Millions)</b>				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
ERP Payload Maturation	MIPR	CCDC GVSC : Warren, MI	-	-		-		0.200	Nov 2021	-		0.200	0.000	0.200	-
<b>Subtotal</b>			82.683	0.975		0.913		1.683		-		1.683	0.000	86.254	N/A

<b>Support (\$ in Millions)</b>				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
PdM SEPM Support	MIPR	Various : Multiple locations	7.282	0.964	Oct 2019	1.000	Oct 2019	0.565	Oct 2021	-		0.565	0.000	9.811	-
SMET Modular Mission Payloads	MIPR	PdM ALUGS : Warren, MI	0.550	-		-		-		-		-	0.000	0.550	-
Technology Demo support (CCDC GVSC)	MIPR	CCDC GVSC : Warren, MI	2.978	-		-		-		-		-	0.000	2.978	-
<b>Subtotal</b>			10.810	0.964		1.000		0.565		-		0.565	0.000	13.339	N/A

<b>Test and Evaluation (\$ in Millions)</b>				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Leader Follower (CCDC GVSC) Tech Demo Testing	MIPR	A TEC : Aberdeen, MD	0.700	-		-		-		-		-	0.000	0.700	-
Leader Follower (CCDC GVSC) Tech Demo Data Logger	MIPR	A TEC : Aberdeen, MD	0.700	-		-		-		-		-	0.000	0.700	-
Leader Follower (CCDC GVSC) Testing	MIPR	Army Test and Evaluation Command (ATEC) : Aberdeen Proving Ground, MD	3.933	-		-		-		-		-	0.000	3.933	-
Leader Follower (CCDC GVSC) Data Logger	MIPR	Army Test and Evaluation	0.750	-		-		-		-		-	0.000	0.750	-

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army	Date: May 2021
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Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604017A / Robotics Development	Project (Number/Name) FD9 / Robotics Systems
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Test and Evaluation (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
		Command (ATEC) : Aberdeen Proving Ground, MD													
PdM RD ATEC support	MIPR	ATEC : Aberdeen, MD	0.150	-		0.400	Nov 2020	-		-		-	0.000	0.550	-
IOP testing	MIPR	GVSC : Warren, MI	-	-		0.135	Feb 2021	-		-		-	0.000	0.135	-
<b>Subtotal</b>			6.233	-		0.535		-		-		-	0.000	6.768	N/A

		Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
<b>Project Cost Totals</b>		103.129	2.926	2.948	2.748	-	2.748	0.000	111.751	N/A

**Remarks**



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**Exhibit R-4, RDT&E Schedule Profile: PB 2022 Army** **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604017A / <i>Robotics Development</i>	<b>Project (Number/Name)</b> FD9 / <i>Robotics Systems</i>
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Event Name	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
<b>Robotics Development</b>																												
RD (ERP, CBRN, CRS-LR, etc.)																												
RD Future Payload Maturation																												
<b>RD MODELING &amp; SIMULATION (M&amp;S)</b>																												
RD M&S																												
RD M&S Initial Capability Development																												
RD M&S Initial Development																												
RD M&S Data Source Matrix Development																												
RD M&S Data Source Matrix																												
<b>RD M&amp;S Developmental testing</b>																												
RD M&S DEV testing																												
<b>RD M&amp;S Use Case Development</b>																												
RD M&S Use Case Dev																												
<b>RD M&amp;S Validation, Verification Accreditation</b>																												
RD Ver/Val/Accreditation																												
<b>Emerging Systems Upgrades</b>																												
<b>MMP M&amp;S Risk Reduction</b>																												
MMP - ATEC Safety Testing																												
MMP - ATEC Safety Testing																												
<b>ABV RCS market research</b>																												
ABV market research																												

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**Exhibit R-4A, RDT&E Schedule Details:** PB 2022 Army **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604017A / <i>Robotics Development</i>	<b>Project (Number/Name)</b> FD9 / <i>Robotics Systems</i>
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Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Robotics Development	1	2017	4	2022
RD (ERP, CBRN, CRS-LR, etc.)	1	2022	4	2024
RD MODELING & SIMULATION (M&S)	1	2017	4	2025
RD M&S Initial Capability Development	4	2017	4	2020
RD M&S Data Source Matrix Development	1	2017	4	2025
RD M&S Developmental testing	2	2018	4	2025
RD M&S Use Case Development	1	2018	4	2025
RD M&S Validation, Verification Accreditation	4	2018	4	2025
Emerging Systems Upgrades	1	2017	4	2025
MMP M&S Risk Reduction	1	2021	4	2025
MMP Experimental Unit Prototyping - Contract Award	1	2019	1	2019
MMP - ATEC Safety Testing	4	2019	2	2020
ABV RCS market research	3	2020	1	2021

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2022 Army **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040: <i>Research, Development, Test &amp; Evaluation, Army / BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0604019A / <i>Expanded Mission Area Missile (EMAM)</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	-	-	-	50.674	-	50.674	-	-	-	-	-	-
BU9: <i>IFPC High Energy Laser</i>	-	-	-	15.015	-	15.015	-	-	-	-	-	-
CO6: <i>IFPC High Power Microwave (HPM)</i>	-	-	-	35.659	-	35.659	-	-	-	-	-	-

**Note**

This is a new start in FY 2022.

Work in this project complements PE 0602150A (Air and Missile Defense Technology) / Project AC9 (High Energy Laser Tactical Vehicle Demonstrator Technology) and PE 0603466A (Air and Missile Defense Advanced Technology) / Project AD1 (High Energy Laser Tactical Vehicle Demo Advanced Technology).

This PE supports transitioning the High Energy Laser -Tactical Vehicle Demonstration S&T effort to manufacturing four rapid prototype vehicles for delivery in FY 2024, with transition to a program of record in FY 2025.

Project BU9 Indirect Fire Protection Capability (IFPC)- High Energy Laser has been restructured to transfer all funds for IFPC-High Power Microwave (HPM) effort to Program Element (PE) 0604019A Expanded Mission Area Missile (EMAM) Project CO6 IFPC-HPM.

**A. Mission Description and Budget Item Justification**

Work in this PE, the Expanded Mission Area Missile (EMAM) program, supports the Integrated Air and Missile Defense (IAMD) architecture and provides Directed Energy - Indirect Fire Protection Capability (DE-IFPC) intercept capability to defeat Cruise Missiles (CM), Unmanned Aircraft System (UAS), and Rocket, Artillery, and Mortar (RAM) threats.

The DE-IFPC is an Air Defense capability consisting of the IFPC-High Energy Laser (HEL) and the IFPC-High Power Microwave (HPM). IFPC-HEL will provide a ground-based weapon system designed to acquire, track, engage, and defeat the CM, UAS, and RAM threats. The IFPC-HEL requirement consists of a vehicle, 300 kW class laser subsystem, power and thermal subsystem, and a beam control subsystem integrated with a battle management command, control and communication software. IFPC-HEL provides much needed protection against adversarial threat systems capable of targeting U.S. and Allied forward operating bases, convoys, and other critical assets.

IFPC-HPM will provide a ground-based weapon system designed to acquire, track, engage, and defeat UAS. The IFPC-HPM requirement consist of a HPM source, power and thermal subsystem, and an antenna subsystem integrated with a battle management command, control and communication software. IFPC-HPM provides much needed protection against adversarial UAS swarms capable of targeting and overwhelming U.S. and Allied air defense systems.

The cited work is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2022 Army	<b>Date:</b> May 2021
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<b>Appropriation/Budget Activity</b> 2040: <i>Research, Development, Test &amp; Evaluation, Army / BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0604019A / <i>Expanded Mission Area Missile (EMAM)</i>
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Work in this PE is performed by the United States Army Rapid Capabilities and Critical Technologies Office (RCCTO).

<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022 Base</b>	<b>FY 2022 OCO</b>	<b>FY 2022 Total</b>
Previous President's Budget	0.000	0.000	0.000	-	0.000
Current President's Budget	0.000	0.000	50.674	-	50.674
Total Adjustments	0.000	0.000	50.674	-	50.674
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	-	-	50.674	-	50.674

**Change Summary Explanation**

Project BU9 IFPC- High Energy Laser has been restructured to transfer all funds for IFPC-HPM effort to PE 0604019A EMAM Project CO6 IFPC-HPM.

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**Exhibit R-2A, RDT&E Project Justification:** PB 2022 Army **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604019A / <i>Expanded Mission Area Missile (EMAM)</i>	<b>Project (Number/Name)</b> BU9 / <i>IFPC High Energy Laser</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
BU9: <i>IFPC High Energy Laser</i>	-	-	-	15.015	-	15.015	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

**Note**

This is a new start in FY 2022.

Work in this project complements PE 0602150A (Air and Missile Defense Technology) / Project AC9 (High Energy Laser Tactical Vehicle Demonstrator Technology) and PE 0603466A (Air and Missile Defense Advanced Technology) / Project AD1 (High Energy Laser Tactical Vehicle Demo Advanced Technology).

This PE supports transitioning the High Energy Laser -Tactical Vehicle Demonstration S&T effort to manufacturing four rapid prototype vehicles for delivery in FY 2024, with transition to a program of record in FY 2025.

Project BU9 Indirect Fire Protection Capability (IFPC)- High Energy Laser TVD has been restructured to transfer all funds for IFPC-High Power Microwave (HPM) effort to Program Element (PE) 0604019A Expanded Mission Area Missile (EMAM) Project CO6 IFPC-HPM.

**A. Mission Description and Budget Item Justification**

The Directed Energy Indirect Fire Protection Capability (DE-IFPC) - High Energy Laser (HEL) is an Air Defense capability consisting of IFPC - HEL 300kW class laser experimental prototypes with residual combat capability at the IFPC Battery Level in support of Multi-Domain Operations (MDO). IFPC-HEL will provide the Army prototype weapon systems for defense of fixed and semi-fixed sites from Cruise Missiles (CM), Unmanned Aircraft Systems (UAS), and Rocket, Artillery, and Mortar (RAM) threats. This project will deliver an operationally effective rapid prototype capabilities in the near- and mid-terms. Efforts will include accelerated materiel development and competitive prototyping. IFPC-HEL funds an improved mechanism to effectively confront emerging threats and advance America's military dominance in accordance with the National Defense Strategy. Efforts include development, acquisition, assessment, maturation, and transition of prototype technologies to acquisition programs.

The cited work is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas, and the Army Modernization Strategy, and supports the Army's future capability opportunities for leap-ahead technology for directed energy.

Work is performed by the United States (US) Army Rapid Capabilities and Critical Technologies Office (RCCTO).

**B. Accomplishments/Planned Programs (\$ in Millions)**

	FY 2020	FY 2021	FY 2022
<b>Title:</b> IFPC-High Energy Laser	-	-	15.015

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604019A / <i>Expanded Mission Area Missile (EMAM)</i>	<b>Project (Number/Name)</b> BU9 / <i>IFPC High Energy Laser</i>

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
<p><b>Description:</b> This effort will provide for the planning, prototype manufacturing, and testing of 4 IFPC-HEL rapid prototypes with residual combat capability to support the IFPC mission. The IFPC-HEL is a 300 kilowatt (kW) modularized laser weapon system that can be integrated onto a Heavy Expanded Mobility Tactical Truck (HEMTT) Palletized Load System (PLS) to defend fixed and semi-fixed sites from Cruise Missiles (CM), Unmanned Aircraft Systems (UAS), and Rocket, Artillery, and Mortar (RAM) threats to be fielded to a IFPC Battery in FY 2024. IFPC-HEL builds on the technology maturation and demonstration from PE 0602150A (Air and Missile Defense Technology) / Project AC9 (High Energy Laser Tactical Vehicle Demonstrator Technology) and PE 0603466A (Air and Missile Defense Advanced Technology) / Project AD1 (High Energy Laser Tactical Vehicle Demo Advanced Technology).</p> <p><b>FY 2022 Plans:</b> These funds will provide systems engineering, program management, engineering, and technical support to transition the High Energy Laser Tactical Vehicle Demonstrator from Science and Technology into rapid prototyping, complete the competitive source selection, award the prototype contract in late FY 2022, and conduct planning to transition to the program of record beginning in FY 2025.</p> <p><b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> The \$15.0 million increase is in support of transitioning the HEL-TVD S&amp;T effort to rapid prototyping 4 prototypes for delivery in FY 2024, with transition to a program of record in FY 2025.</p>			
<b>Accomplishments/Planned Programs Subtotals</b>	-	-	15.015

**C. Other Program Funding Summary (\$ in Millions)**

N/A

**Remarks**

**D. Acquisition Strategy**

The Army RCCTO capitalizes on current and emerging technologies to provide near-term and mid-term solutions to address emerging threats and high impact capability opportunities for U.S. Army Forces deployed globally. DE-IFPC will utilize streamlined acquisition methods, processes and techniques to rapidly acquire capability. IFPC HEL will utilize the RCCTO procurement authority and an in-house contracting staff, with the flexibility to use both traditional and non-traditional contracting approaches. Where practicable, both IFPC-HEL prototypes will be acquired using competitive procedures. Soldier touch points will be conducted to provide feedback in support of Army requirements generation, prototype maturation, fielding residual combat capability to a unit of action, and future capability development.

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<b>Exhibit R-3, RDT&amp;E Project Cost Analysis: PB 2022 Army</b>										<b>Date:</b> May 2021					
<b>Appropriation/Budget Activity</b> 2040 / 4					<b>R-1 Program Element (Number/Name)</b> PE 0604019A / Expanded Mission Area Mi ssile (EMAM)					<b>Project (Number/Name)</b> BU9 / IFPC High Energy Laser					

<b>Management Services (\$ in Millions)</b>				<b>FY 2020</b>		<b>FY 2021</b>		<b>FY 2022 Base</b>		<b>FY 2022 OCO</b>		<b>FY 2022 Total</b>				
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>	
Program Management Support	TBD	Various : Various	-	-		-		1.501		-		1.501	0.000	1.501	-	
<b>Subtotal</b>			-	-		-		1.501		-		1.501	0.000	1.501	N/A	

<b>Product Development (\$ in Millions)</b>				<b>FY 2020</b>		<b>FY 2021</b>		<b>FY 2022 Base</b>		<b>FY 2022 OCO</b>		<b>FY 2022 Total</b>				
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>	
Indirect Fire Protection Capability - High Energy Laser (IFPC-HEL)	TBD	TBD : TBD	-	-		-		13.514		-		13.514	0.000	13.514	-	
<b>Subtotal</b>			-	-		-		13.514		-		13.514	0.000	13.514	N/A	

	<b>Prior Years</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022 Base</b>	<b>FY 2022 OCO</b>	<b>FY 2022 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>									
<b>Project Cost Totals</b>										-	-	0.000	15.015	-	15.015	0.000	15.015	N/A

**Remarks**

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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2022 Army</b>		<b>Date: May 2021</b>
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604019A / <i>Expanded Mission Area Missile (EMAM)</i>	<b>Project (Number/Name)</b> BU9 / <i>IFPC High Energy Laser</i>

Event Name	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026							
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4				
IFPC-HEL Source Selection																																
IFPC-HEL Award Prototype Contract																	▲ 1															
IFPC-HEL Prototype Fabrication																																
IFPC-HEL Prototype Delivery																									▲ 2							
IFPC-HEL Contractor Logistics Support																																



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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604019A / <i>Expanded Mission Area Missile (EMAM)</i>	<b>Project (Number/Name)</b> BU9 / <i>IFPC High Energy Laser</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
IFPC-HEL Source Selection	2	2022	4	2022
IFPC-HEL Award Prototype Contract	1	2023	1	2023
IFPC-HEL Prototype Fabrication	2	2023	4	2024
IFPC-HEL Prototype Delivery	4	2024	4	2024
IFPC-HEL Contractor Logistics Support	1	2025	4	2025

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**Exhibit R-2A, RDT&E Project Justification:** PB 2022 Army **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4					<b>R-1 Program Element (Number/Name)</b> PE 0604019A / Expanded Mission Area Missile (EMAM)				<b>Project (Number/Name)</b> CO6 / IFPC High Power Microwave (HPM)			
COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
CO6: IFPC High Power Microwave (HPM)	-	-	-	35.659	-	35.659	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**Note**

This is a new start in FY 2022.

Project BU9 Indirect Fire Protection Capability (IFPC)- High Energy Laser has been restructured to transfer all funds for IFPC-High Power Microwave (HPM) effort to Program Element (PE) 0604019A Expanded Mission Area Missile (EMAM) Project CO6 IFPC-HPM.

**A. Mission Description and Budget Item Justification**

The Indirect Fire Protection Capability (DE-IFPC) - High Power Microwave (HPM) is an Air Defense capability consisting of the IFPC - HPM experimental prototype with residual combat capability at the IFPC Battery Level in support of Multi-domain Operations (MDO). IFPC-HPM will provide the Army with a High Powered Microwave prototype weapon systems for the short-range defense of fixed and semi-fixed sites from Unmanned Aircraft Systems (UAS) threats. This project will deliver an operationally effective rapid prototype capabilities in the near- and mid-terms. Efforts will include accelerated materiel development and competitive prototyping. IFPC-HPM funds an improved mechanism to effectively confront emerging threats and advance America's military dominance in accordance with the National Defense Strategy. Efforts include development, acquisition, assessment, maturation, and transition of prototype technologies to acquisition programs.

The cited work is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas, and the Army Modernization Strategy, and supports the Army's future capability opportunities for leap-ahead technology for directed energy.

Work is performed by the United States (US) Army Rapid Capabilities and Critical Technologies Office (RCCTO).

**B. Accomplishments/Planned Programs (\$ in Millions)**

	FY 2020	FY 2021	FY 2022
<b>Title:</b> IFPC-High Power Microwave	-	-	35.659
<b>Description:</b> This effort will provide for the development, planning, prototype manufacturing, and testing of 4 IFPC-HPM rapid prototypes with residual combat capability to support the IFPC mission. The IFPC-HPM is a containerized HPM weapon system that can be transported by common brigade combat team equipment to defend fixed and semi-fixed sites from UAS, and particularly UAS swarms. IFPC-HPM is common with US Air Force and the Joint Counter-UAS Office HPM effectors for countering UAS. IFPC-HPM builds on previous Air Force HPM technology demonstrations and experimentation campaigns such as the Tactical High-Power Responder (THOR).			
<b>FY 2022 Plans:</b>			

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604019A / <i>Expanded Mission Area Missile (EMAM)</i>	<b>Project (Number/Name)</b> CO6 / <i>IFPC High Power Microwave (HPM)</i>

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
<p>These funds will provide systems engineering, program management, engineering, and technical support to transition Air Force HPM Science and Technology demonstrators into rapid prototyping. US Air Force contracts will be leveraged to complete the development and prototyping of the common HPM system, delivering 4 prototypes in FY 2024. Funding will also be utilized to conduct planning to transition to the program of record beginning in FY 2025.</p> <p><b><i>FY 2021 to FY 2022 Increase/Decrease Statement:</i></b>                      The \$35.7 million increase is in support of transitioning Air Force technology demonstrators to rapid prototypes for delivery in FY 2024, with transition to a program of record in FY 2025.</p>			
<b>Accomplishments/Planned Programs Subtotals</b>	-	-	35.659

**C. Other Program Funding Summary (\$ in Millions)**

N/A

**Remarks**

**D. Acquisition Strategy**

The Army RCCTO capitalizes on current and emerging technologies to provide near-term and mid-term solutions to address emerging threats and high impact capability opportunities for U.S. Army Forces deployed globally. DE-IFPC will utilize streamlined acquisition methods, processes and techniques to rapidly acquire capability. IFPC-HPM will leverage US Air Force contracts to provide prototypes. Soldier touchpoints will be conducted to provide feedback in support of Army requirements generation, prototype maturation, fielding residual combat capability to a unit of action, and future capability development.

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<b>Exhibit R-3, RDT&amp;E Project Cost Analysis: PB 2022 Army</b>												<b>Date: May 2021</b>				
<b>Appropriation/Budget Activity</b> 2040 / 4						<b>R-1 Program Element (Number/Name)</b> PE 0604019A / Expanded Mission Area Missile (EMAM)				<b>Project (Number/Name)</b> CO6 / IFPC High Power Microwave (HPM)						
<b>Management Services (\$ in Millions)</b>				<b>FY 2020</b>		<b>FY 2021</b>		<b>FY 2022 Base</b>		<b>FY 2022 OCO</b>		<b>FY 2022 Total</b>				
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>	
Program Management Support	Various	Various : Various	-	-		-		3.566		-		3.566	0.000	3.566	-	
<b>Subtotal</b>			-	-		-		3.566		-		3.566	0.000	3.566	N/A	
<b>Product Development (\$ in Millions)</b>				<b>FY 2020</b>		<b>FY 2021</b>		<b>FY 2022 Base</b>		<b>FY 2022 OCO</b>		<b>FY 2022 Total</b>				
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>	
Indirect Fire Protection Capability - High Power Microwave (IFPC-HPM)	TBD	TBD : TBD	-	-		-		32.093		-		32.093	0.000	32.093	-	
<b>Subtotal</b>			-	-		-		32.093		-		32.093	0.000	32.093	N/A	
			<b>Prior Years</b>	<b>FY 2020</b>	<b>FY 2021</b>		<b>FY 2022 Base</b>		<b>FY 2022 OCO</b>		<b>FY 2022 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>		
<b>Project Cost Totals</b>			-	-	0.000		35.659		-		35.659	0.000	35.659	N/A		
<b>Remarks</b>																

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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2022 Army</b>		<b>Date: May 2021</b>
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604019A / <i>Expanded Mission Area Missile (EMAM)</i>	<b>Project (Number/Name)</b> CO6 / <i>IFPC High Power Microwave (HPM)</i>

Event Name	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026							
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4				
IFPC-HPM Engineering Change Order Implementation (USAF)									■																							
IFPC-HPM Army Decision Point																	▲ 1															
IFPC-HPM Prototyping Review																					▲ 2											
IFPC-HPM Prototype Fabrication																					■											
IFPC-HPM Prototype Delivery																									▲ 3							
IFPC-HPM Contractor Logistic Support																													■			

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604019A / <i>Expanded Mission Area Missile (EMAM)</i>	<b>Project (Number/Name)</b> CO6 / <i>IFPC High Power Microwave (HPM)</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
IFPC-HPM Engineering Change Order Implementation IUSAF)	1	2022	4	2022
IFPC-HPM Army Decision Point	4	2022	4	2022
IFPC-HPM Prototyping Review	1	2023	1	2023
IFPC-HPM Prototype Fabrication	2	2023	4	2024
IFPC-HPM Prototype Delivery	4	2024	4	2024
IFPC-HPM Contractor Logistic Support	1	2025	4	2025

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2022 Army **Date:** May 2021

<b>Appropriation/Budget Activity</b>					<b>R-1 Program Element (Number/Name)</b>							
2040: <i>Research, Development, Test &amp; Evaluation, Army / BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>					PE 0604021A / <i>Electronic Warfare Technology Maturation (MIP)</i>							
COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	-	23.043	15.034	-	-	-	-	-	-	-	-	-
AW7: <i>Electronic Warfare Technology Maturation</i>	-	23.043	15.034	-	-	-	-	-	-	-	-	-

**Note**

PE 0604021A has no FY2022 Funding Request.

**A. Mission Description and Budget Item Justification**

Terrestrial Layer System (TLS) provides Army maneuver forces integrated full spectrum Signals Intelligence (SIGINT), Electronic Warfare (EW), and Cyber-enabling non-kinetic offensive operation options to Brigade Combat Team (BCT) and Expeditionary-Military Intelligence Brigade (EMIB) commanders. TLS' information superiority provides Indications and Warnings, Force Protection and Situational Awareness to influence the commander's decision cycle, improve targeting timeliness and accuracy, and provide the maneuver commander with electronic attack and offensive cyber warfare options to deny, degrade, disrupt, or otherwise manipulate the targeted force. TLS employs technologically advanced systems with a modular open-system approach for multiple operation configurations that can be efficiently sustained and effectively upgraded to provide capabilities against changing near peer and emerging threats to address multi-domain capability gaps.

**B. Program Change Summary (\$ in Millions)**

	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022 Base</u>	<u>FY 2022 OCO</u>	<u>FY 2022 Total</u>
Previous President's Budget	23.043	22.840	0.000	-	0.000
Current President's Budget	23.043	15.034	0.000	-	0.000
Total Adjustments	0.000	-7.806	0.000	-	0.000
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-7.806			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			

**Congressional Add Details (\$ in Millions, and Includes General Reductions)**

**Project:** AW7: *Electronic Warfare Technology Maturation*

Congressional Add: *Counter drone RF-signal based targeting*

Congressional Add Subtotals for Project: AW7

	FY 2020	FY 2021
	5.000	-
	5.000	-

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2022 Army	<b>Date:</b> May 2021
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<b>Appropriation/Budget Activity</b> 2040: <i>Research, Development, Test &amp; Evaluation, Army / BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0604021A / <i>Electronic Warfare Technology Maturation (MIP)</i>
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<u>Congressional Add Details (\$ in Millions, and Includes General Reductions)</u>	FY 2020	FY 2021
Congressional Add Totals for all Projects	5.000	-

**Change Summary Explanation**

FY2021 PE 0604021A Project AW7 Congressional decrease of \$7.806 million citing improving funds management.



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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army										<b>Date:</b> May 2021		
<b>Appropriation/Budget Activity</b> 2040 / 4					<b>R-1 Program Element (Number/Name)</b> PE 0604021A / <i>Electronic Warfare Technology Maturation (MIP)</i>				<b>Project (Number/Name)</b> AW7 / <i>Electronic Warfare Technology Maturation</i>			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022 Base</b>	<b>FY 2022 OCO</b>	<b>FY 2022 Total</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>FY 2026</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
AW7: <i>Electronic Warfare Technology Maturation</i>	-	23.043	15.034	-	-	-	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**Note**

PE 0604021A Project AW7 has no FY2022 Funding Request.

**A. Mission Description and Budget Item Justification**

Terrestrial Layer System (TLS) provides Army maneuver forces integrated full spectrum Signals Intelligence (SIGINT), Electronic Warfare (EW), and Cyber-enabling non-kinetic offensive operation options to Brigade Combat Team (BCT) and Expeditionary-Military Intelligence Brigade (EMIB) commanders. TLS' information superiority provides Indications and Warnings, Force Protection and Situational Awareness to influence the commander's decision cycle, improve targeting timeliness and accuracy, and provide the maneuver commander with electronic attack and offensive cyber warfare options to deny, degrade, disrupt, or otherwise manipulate the targeted force. TLS employs technologically advanced systems with a modular open-system approach for multiple operation configurations that can be efficiently sustained and effectively upgraded to provide capabilities against changing near peer and emerging threats to address multi-domain capability gaps.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
<b>Title:</b> Technical / Program Management	2.282	0.719	-
<b>Description:</b> Funds will provide for technical engineering and program management.			
<b>FY 2021 Plans:</b> FY 2021 technical engineering and program management support for TLS.			
<b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> FY2021 is the last year that Budget Activity 4 (BA4) funding is required for Terrestrial Layer System; FY2021 and beyond RDT&E efforts are funded via 0304270A FJ5.			
<b>Title:</b> Systems Engineering and Component Prototyping	15.761	14.315	-
<b>Description:</b> Funds will provide for, but are not limited to development, engineering and evaluation of component level technologies to include antennas, radios, software architecture and other Signals Intelligence (SIGINT), Electronic Warfare Support (ES), Electronic Attack (EA) and Cyber enabling components to mature technical feasibility and reduce Critical Technology Element (CTE) risks. Funds will support, but are not limited to the development capabilities to enhance and integrate Signals of Interest, develop system level designs, reduce Size, Weight and Power (SWaP), to mature components into an			

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604021A / <i>Electronic Warfare Technology Maturation (MIP)</i>	<b>Project (Number/Name)</b> AW7 / <i>Electronic Warfare Technology Maturation</i>

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
emerging Program of Record (PoR) level technology maturation level, and to support the evaluation environment to conduct required developmental events.			
<b><i>FY 2021 Plans:</i></b> Continue development of SIGINT, ES, EA and cyber enabling components and system alternatives. Continue to mature and evaluate critical technologies, co-develop Intelligence Community (IC) Signals of Interest (SOI), develop sub-systems, components and reduce component integration risks in a system solution that can be evaluated for affordability, feasibility, and technical maturity; all of which will reduce program technical and cost risks.			
<b><i>FY 2021 to FY 2022 Increase/Decrease Statement:</i></b> FY2021 is the last year that Budget Activity 4 (BA4) funding is required for Terrestrial Layer System; FY2021 and beyond RDT&E efforts are funded via 0304270A FJ5.			
<b>Accomplishments/Planned Programs Subtotals</b>	18.043	15.034	-

	<b>FY 2020</b>	<b>FY 2021</b>
<b><i>Congressional Add:</i></b> Counter drone RF-signal based targeting	5.000	-
<b><i>FY 2020 Accomplishments:</i></b> Development of counter drone RF-signal based targeting.		
<b>Congressional Adds Subtotals</b>	5.000	-

**C. Other Program Funding Summary (\$ in Millions)**

<b>Line Item</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022 Base</b>	<b>FY 2022 OCO</b>	<b>FY 2022 Total</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>FY 2026</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
• FJ5: <i>Terrestrial Layer System</i>	-	38.105	50.624	-	50.624	-	-	-	-	-	-
• B97610: <i>TERRESTRIAL LAYER SYSTEM BCT</i>	-	8.081	39.240	-	39.240	-	-	-	-	-	-

**Remarks**

**D. Acquisition Strategy**

A competitive acquisition approach for component development and prototyping is planned for TLS using a tailored acquisition strategy to rapidly deliver an initial integrated signals intelligence, electronic warfare and cyber capability to the Army. These efforts will be used, but are not limited to identify, develop, prototype, evaluate, analyze, and demonstrate potential capabilities and alternative solutions. These efforts will quantify the respective maturity and effectiveness to mitigate capability gaps against changing near peer representative enemy target sets and operational scenarios. Enhanced capability and other technologies to provide overmatch capabilities will be evaluated for merit and will provide increased performance for production of TLS systems in FY 2022.



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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2022 Army</b>			<b>Date: May 2021</b>
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604021A / <i>Electronic Warfare Technology Maturation (MIP)</i>	<b>Project (Number/Name)</b> AW7 / <i>Electronic Warfare Technology Maturation</i>	

Event Name	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Milestone A		▲1																										
Component Engineering and Prototyping			■	■																								
Mid Tier Acquisition Approval		▲2																										
Integration on Stryker							■	■																				
Field Test 1								■																				
Field Test 2												■																
Long Lead Component Procurement							■	■																				
Rapid Fielding or MS C Decision Point												▲3																
Production on Stryker Variant												■	■	■	■													
First Unit Equipped with TLS on Strkyer														▲4														
IOT&E / Log Demo														■														
Integration & Evaluation on AMPV												■	■	■	■													
TLS Production on AMPV																			■	■	■	■						

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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2022 Army</b>			<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604021A / <i>Electronic Warfare Technology Maturation (MIP)</i>	<b>Project (Number/Name)</b> AW7 / <i>Electronic Warfare Technology Maturation</i>	

Event Name	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Integration & Evaluation on IBCT Platform ("Y")																												
TLS Production on IBCT Platform ("Y")																												
Iterative Prototyping																												

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604021A / <i>Electronic Warfare Technology Maturation (MIP)</i>	<b>Project (Number/Name)</b> AW7 / <i>Electronic Warfare Technology Maturation</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Milestone A	2	2020	2	2020
Component Engineering and Prototyping	3	2020	2	2021
Mid Tier Acquisition Approval	3	2020	3	2020
Integration on Stryker	2	2021	1	2022
Field Test 1	4	2021	4	2021
Field Test 2	4	2021	1	2022
Long Lead Component Procurement	2	2021	1	2022
Rapid Fielding or MS C Decision Point	1	2022	1	2022
Production on Stryker Variant	2	2022	4	2024
First Unit Equipped with TLS on Strkyer	4	2022	4	2022
IOT&E / Log Demo	1	2023	1	2023
Integration & Evaluation on AMPV	2	2022	4	2023
TLS Production on AMPV	4	2023	1	2025
Integration & Evaluation on IBCT Platform ("Y")	2	2023	4	2024
TLS Production on IBCT Platform ("Y")	1	2025	4	2026
Iterative Prototyping	1	2022	1	2027

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2022 Army **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040: Research, Development, Test & Evaluation, Army / BA 4: Advanced Component Development & Prototypes (ACD&P)					<b>R-1 Program Element (Number/Name)</b> PE 0604035A / Low Earth Orbit (LEO) Satellite Capability							
COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	-	-	21.850	19.638	-	19.638	-	-	-	-	-	-
BX7: Low Earth Orbit (LEO) Satellite Capability	-	-	21.850	19.638	-	19.638	-	-	-	-	-	-

**A. Mission Description and Budget Item Justification**

The United States Army Tactical Space Strategy provides tactical land component forces with space-based capabilities required to close the top three Large Scale Combat Operations (LSCO) gaps; Multi-Domain Deep Sensing, Analysis, and Processing Exploitation and Dissemination (PED) to Target Threat Anti-Access/Area Denial (A2AD); Penetrate and Dis-Integrate A2AD; Long Range Fires to Enable Counter Fire and Shaping Operations. National, DoD, commercial Space-based, and High Altitude (HA) sensor data will be integrated in ground architecture to provide resilient communications, assured Positioning, Navigation, and Timing (PNT) and deep sensing capabilities required in the targeting process to enable rapid and responsive sensor-to-shooter applications required to engage and defeat A2/AD forces and enable force projection and maneuver in contested Multi-Domain Operations.

The Low Earth Orbit (LEO) Battle Management Command, Control and Infrastructure will provide prototyping, experimentation, and risk reduction activities for ground architecture, supporting wide area, responsive, and deep area sensing required for Beyond Line of Sight (BLOS) targeting and force maneuver, significantly reducing Sensor to Shooter (S2S) timelines. It will enable warfighters at the tactical edge to dynamically task, receive and disseminate data to directly support live-fire S2S demonstrations and assessments including Assured Positioning, Navigation, and Timing (APNT) Cross Functional Team (CFT) Campaign of Learning and Army Futures Command (AFC) Project Convergence.

Follow-on persistent prototype tactical sensor capabilities will be operational by FY 2022 and will be integrated with the Army Tactical Intelligence Targeting Access Node (TITAN) ground station and Theater Gateways to tactically task, receive and disseminate data to directly support live-fire S2S demonstrations and assessments.

<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022 Base</b>	<b>FY 2022 OCO</b>	<b>FY 2022 Total</b>
Previous President's Budget	0.000	22.678	19.881	-	19.881
Current President's Budget	0.000	21.850	19.638	-	19.638
Total Adjustments	0.000	-0.828	-0.243	-	-0.243
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-0.828			
• Adjustments to Budget Years	-	-	-0.243	-	-0.243

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Army Date: May 2021

**Appropriation/Budget Activity**  
2040: *Research, Development, Test & Evaluation, Army / BA 4: Advanced Component Development & Prototypes (ACD&P)*

**R-1 Program Element (Number/Name)**  
PE 0604035A / *Low Earth Orbit (LEO) Satellite Capability*

**Change Summary Explanation**

FY2021 for SBIR transfer. FY2022 adjustment for Army internal adjustments to other priorities.



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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army										<b>Date:</b> May 2021		
<b>Appropriation/Budget Activity</b> 2040 / 4					<b>R-1 Program Element (Number/Name)</b> PE 0604035A / <i>Low Earth Orbit (LEO) Satellite Capability</i>				<b>Project (Number/Name)</b> BX7 / <i>Low Earth Orbit (LEO) Satellite Capability</i>			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022 Base</b>	<b>FY 2022 OCO</b>	<b>FY 2022 Total</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>FY 2026</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
<i>BX7: Low Earth Orbit (LEO) Satellite Capability</i>	-	-	21.850	19.638	-	19.638	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**Note**

In Fiscal Year (FY) 2022, Project BX7 Low Earth Orbit (LEO) Satellite Capability transitions from Program Element (PE) 1206308A, Project FE5 Space And Missile Defense Integration.

**A. Mission Description and Budget Item Justification**

The United States Army Tactical Space Strategy provides tactical land component forces with space-based capabilities required to close the top three Large Scale Combat Operations (LSCO) gaps. National, Department of Defense (DoD), commercial Space-based, and High Altitude (HA) sensor data will be integrated in ground architecture to provide resilient communications, assured Positioning, Navigation, and Timing (PNT) and deep sensing capabilities required in the targeting process to enable rapid and responsive sensor-to-shooter applications required to engage and defeat A2/AD forces and enable force projection and maneuver in contested Multi-Domain Operations.

The Low Earth Orbit (LEO) Battle Management Command, Control and Infrastructure will provide prototyping, experimentation, and risk reduction activities for ground architecture, supporting wide area, responsive, and deep area sensing required for Beyond Line of Sight (BLOS) targeting and force maneuver, significantly reducing Sensor to Shooter (S2S) timelines. It will enable warfighters at the tactical edge to dynamically task, receive and disseminate data to directly support live-fire S2S demonstrations and assessments including Assured Positioning, Navigation, and Timing (APNT) Cross Functional Team (CFT) Campaign of Learning and Army Futures Command (AFC) Project Convergence.

FY2022 Base funding in the amount of \$19.638 million provides: prototyping, experimentation, and risk reduction activities to ground station architecture, supporting wide area, responsive, and deep area sensing and force maneuver. It will enable ground stations to dynamically task, receive and disseminate data to directly support live-fire S2S demonstrations and assessments.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
<b>Title:</b> LEO Satellite Capability	-	17.100	19.638
<b>Description:</b> The United States Army Tactical Space Strategy provides tactical land component forces with space-based capabilities required to close the top three Large Scale Combat Operations (LSCO) gaps. National, DoD, commercial Space-based, and High Altitude (HA) sensor data will be integrated in ground architecture to provide resilient communications, assured Positioning, Navigation, and Timing (PNT) and deep sensing capabilities required in the targeting process to enable rapid and			

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army		<b>Date:</b> May 2021		
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604035A / <i>Low Earth Orbit (LEO) Satellite Capability</i>	<b>Project (Number/Name)</b> BX7 / <i>Low Earth Orbit (LEO) Satellite Capability</i>		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
<p>responsive sensor-to-shooter applications required to engage and defeat A2/AD forces and enable force projection and maneuver in contested Multi-Domain Operations.</p> <p>The Low Earth Orbit (LEO) Battle Management Command, Control and Infrastructure will provide prototyping, experimentation, and risk reduction activities for ground architecture, supporting wide area, responsive, and deep area sensing required for Beyond Line of Sight (BLOS) targeting and force maneuver, significantly reducing Sensor to Shooter (S2S) timelines. It will enable warfighters at the tactical edge to dynamically task, receive and disseminate data to directly support live-fire S2S demonstrations and assessments including Assured Positioning, Navigation, and Timing (APNT) Cross Functional Team (CFT) Campaign of Learning and Army Futures Command (AFC) Project Convergence.</p> <p><b>FY 2021 Plans:</b> LEO Satellite Capability Begin validation of demonstration constellation in a realistic operational environment. Evaluate the integrated RSTA, PNT, BMC2, and communications technologies to identify and locate targets of interest in denied and contested environments actionable to the tactical warfighter.</p> <p><b>FY 2022 Plans:</b> Continues the demonstration and validation of ground architecture, evaluating ability to provide wide area, responsive, and deep area sensing required for beyond line of sight (BLOS) targeting and force maneuver, significantly reducing sensor to shooter (S2S) timelines. Evaluation to be conducted through multiple assessment events including the Assured Position, Navigation, Timing (APNT) Cross Functional Team (CFT) Campaign of Learning and AFC Project Convergence. These will provide a realistic operational environment to evaluate the integrated Intelligence, Surveillance, and Recognizance (ISR), Positioning, Navigation and Timing (PNT), Battle Management Command and Control (BMC2), and communications data to identify and locate targets of interest in denied and contested environments actionable to the tactical warfighter. This will be executed through the S2S Demo/ Experimentation Plan which began with the first Positioning, Navigation and Timing (PNT) Assessment Exercise (PNTAX) in FY19, working through three Live Fire Exercises and follow on exercises in Europe and the Pacific, and culminating with Project Convergence. This Demo/Experimentation cycle is extremely important as it is the Army's mechanism to ensure current and future funding is being correctly applied against the most critical requirements. It provides an iterative framework for rapid concept of operations and tactics, techniques, and procedures development, evaluation and revision and for rapid technology insertion.</p> <p><b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> In Fiscal Year (FY) 2021, Project BX7 Low Earth Orbit (LEO) Satellite Capability transitioned from Program Element (PE) 1206308A, Project FE5 Space And Missile Defense Integration.</p>				
<b>Title:</b> APNT Integrated Space Communications		-	4.750	-

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604035A / <i>Low Earth Orbit (LEO) Satellite Capability</i>	<b>Project (Number/Name)</b> BX7 / <i>Low Earth Orbit (LEO) Satellite Capability</i>

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
<p><b>Description:</b> Development of a unique advanced space communications capability to explore advanced ground based space communications technologies and concepts utilizing bi-static Radio Frequency (RF) scattering and propagation with precision frequency, phase, and power management. This space communications capability will develop and demonstrate multiple advanced Army LEO space communications concepts and will also assess interfacing with multiple Joint Service space communication missions</p> <p><b>FY 2021 Plans:</b> Assess performance of space communications capabilities of multiple advanced Army LEO space communications concepts and interfacing with multiple Joint Services.</p> <p><b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> In Fiscal Year 2021, Project BX7 Low Earth Orbit (LEO) Satellite Capability transitioned from Program Element (PE) 1206308A, Project FE5 Space And Missile Defense Integration.</p>			
<b>Accomplishments/Planned Programs Subtotals</b>	-	21.850	19.638

<b>C. Other Program Funding Summary (\$ in Millions)</b>											
<b>Line Item</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022 Base</b>	<b>FY 2022 OCO</b>	<b>FY 2022 Total</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>FY 2026</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
• 0603766A: <i>Tactical Electronic Surveillance System - Adv Dev</i>	37.490	182.400	113.365	-	113.365	-	-	-	-	-	-

**Remarks**  
Development by Project BX7 LEO Satellite Capability are in conjunction and complement Project CC5 LEO ISR. ref. PE 0603766A.CC5

**D. Acquisition Strategy**  
The Army signed a Memorandum of Agreement (MOA) with the Mission Partner in November 19, 2019 at the direction of Under Secretary of Defense (Intelligence) (USD(I)) and Office of Management and Budget (OMB). This relationship has shown promise to building and delivering capacity for the Army. The MOA will allow the Army to leverage on orbit experimental Intelligence, Surveillance, and Recognizance (ISR) satellites that will accelerate the Army's development of Concept of Operations (CONOPs) and Tactics, techniques and procedures (TTPs), refine requirements necessary to mitigate deep sensing gap, shorten the Sensor to Shooter timeline and improve situational awareness for warfighters at both the operational and tactical level.

This funding will enable the Army to utilize on-orbit demonstrations systems in numerous large scale exercises within United States European Command (EUCOM) and U.S. Indo-Pacific Command (INDOPACOM) areas of responsibility (AORs) to define the Army's tactical requirements CONOPs, and TTPs for on demand/direct link theater access, at echelon, to space-based ISR capabilities with trained/certified Soldiers turns previously "opportunistic" collection into "assured" collection to support dynamic targeting and enhanced situational awareness. It will enable ground stations to dynamically task, receive and disseminate data to directly support live-fire

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army	<b>Date:</b> May 2021
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<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604035A / <i>Low Earth Orbit (LEO) Satellite Capability</i>	<b>Project (Number/Name)</b> BX7 / <i>Low Earth Orbit (LEO) Satellite Capability</i>
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S2S demonstrations and assessments including Assured Position, Navigation, Timing (APNT) Cross Functional Team (CFT) Campaign of Learning and AFC Project Convergence. Existing Mission Partner contracts and Aviation & Missile Technology Consortium (AMTC) OTAs will be used for Prototype Development, Engineering Services and Test and Evaluation Support.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army												Date: May 2021			
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)							
2040 / 4				PE 0604035A / Low Earth Orbit (LEO) Satellite Capability				BX7 / Low Earth Orbit (LEO) Satellite Capability							
Management Services (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Matrix Gov/SETA Support LEO	C/FFP	Multiple : Multiple Locations	-	-		3.000	Oct 2020	-		-		-	0.000	3.000	Continuing
Matrix Gov/SETA Support APNT Integrated Space Communications	TBD	Multiple : Multiple Locations	-	-		1.000	Oct 2020	-		-		-	0.000	1.000	Continuing
Prototype Development and Engineering Services Support	C/FFP	Multiple : Multiple	-	-		-		3.930	Oct 2021	-		3.930	0.000	3.930	-
<b>Subtotal</b>			-	-		4.000		3.930		-		3.930	0.000	7.930	N/A
Product Development (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
LEO Satellite Infrastructure Capabilities Development	TBD	Multiple : Multiple	-	-		14.100	Feb 2021	11.708	Jan 2022	-		11.708	0.000	25.808	Continuing
APNT Integrated Space Communications	C/FFP	Classified : Classified	-	-		3.750	Jan 2021	-		-		-	0.000	3.750	Continuing
<b>Subtotal</b>			-	-		17.850		11.708		-		11.708	0.000	29.558	N/A
Test and Evaluation (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
LEO Infrastructure Test and Evaluation	TBD	Multiple : TBD	-	-		-		4.000	Jan 2022	-		4.000	0.000	4.000	-
<b>Subtotal</b>			-	-		-		4.000		-		4.000	0.000	4.000	N/A
<b>Project Cost Totals</b>			-	-		21.850		19.638		-		19.638	0.000	41.488	N/A

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<b>Exhibit R-3, RDT&amp;E Project Cost Analysis:</b> PB 2022 Army							<b>Date:</b> May 2021			
<b>Appropriation/Budget Activity</b> 2040 / 4			<b>R-1 Program Element (Number/Name)</b> PE 0604035A / <i>Low Earth Orbit (LEO) Satellite Capability</i>			<b>Project (Number/Name)</b> BX7 / <i>Low Earth Orbit (LEO) Satellite Capability</i>				
	<b>Prior Years</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022 Base</b>	<b>FY 2022 OCO</b>	<b>FY 2022 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>	

**Remarks**

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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2022 Army</b>			<b>Date: May 2021</b>
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604035A / Low Earth Orbit (LEO) Satellite Capability	<b>Project (Number/Name)</b> BX7 / Low Earth Orbit (LEO) Satellite Capability	

Event Name	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
LEO Satellite Capability																												

**Note**  
LEO activities transitioned to this PE 0604035A Project BX7 in FY2022 from previous PE 1206308A, Project FE5 Space And Missile Defense Integration.

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604035A / <i>Low Earth Orbit (LEO) Satellite Capability</i>	<b>Project (Number/Name)</b> BX7 / <i>Low Earth Orbit (LEO) Satellite Capability</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
LEO Satellite Capability	1	2022	4	2027



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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2022 Army **Date:** May 2021

<b>Appropriation/Budget Activity</b>					<b>R-1 Program Element (Number/Name)</b>							
2040: Research, Development, Test & Evaluation, Army / BA 4: Advanced Component Development & Prototypes (ACD&P)					PE 0604036A / Multi-Domain Sensing System (MDSS) Adv Dev							
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022 Base</b>	<b>FY 2022 OCO</b>	<b>FY 2022 Total</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>FY 2026</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
Total Program Element	-	-	-	50.548	-	50.548	-	-	-	-	-	-
BY9: Multi-Domain Sensing System Adv Dev	-	-	-	50.548	-	50.548	-	-	-	-	-	-

**Note**

MDSS 0604036A is not a New Start. MDSS received an initial \$39.625 million on PE 0603766A in FY 2021 and transitioned to 0604036A in FY 2022.

**A. Mission Description and Budget Item Justification**

The Multi Domain Sensing System (MDSS) will provide advanced aerial intelligence sensing capabilities for Multi-Domain Operations (MDO) against peer and near-peer adversaries. Initial MDSS development focuses on the High Accuracy Detection and Exploitation System (HADES), providing globally deployable, MDO-relevant sensing at extended ranges for indications and warnings, electronic order of battle, and patterns of life for the competition phase of MDO, and target development for the transition to conflict. In conflict, it will operate at standoff distances for survivability against enemy air defenses. HADES will comprise multi-faceted sensing on higher altitude, longer endurance fixed-wing aircraft that can provide effective stand-off from enemy anti-access/area denial systems. HADES sensors will include signals intelligence (SIGINT) (electronic intelligence (ELINT) and communications intelligence (COMINT)), and synthetic aperture radar (SAR)/moving target indicator (MTI) in its first increment. Future increments will add cyber/electronic warfare (EW) systems and use air-launched effects (ALE) to extend sensing ranges. These capabilities will enable ground commanders to detect, locate, identify, track, and target critical enemy assets on the ground, supporting tactical consumers like Long Range Precision Fires (LRPF).

FY 2022 base dollars in the amount of \$50.548 million support the continued development and prototyping of SIGINT and SAR/MTI sensors and Open Architecture to meet MDSS HADES requirements.

**B. Program Change Summary (\$ in Millions)**

	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022 Base</b>	<b>FY 2022 OCO</b>	<b>FY 2022 Total</b>
Previous President's Budget	0.000	0.000	0.000	-	0.000
Current President's Budget	0.000	0.000	50.548	-	50.548
Total Adjustments	0.000	0.000	50.548	-	50.548
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	-	-	50.548	-	50.548

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Army Date: May 2021

**Appropriation/Budget Activity**  
2040: Research, Development, Test & Evaluation, Army / BA 4: Advanced Component Development & Prototypes (ACD&P)

**R-1 Program Element (Number/Name)**  
PE 0604036A / Multi-Domain Sensing System (MDSS) Adv Dev

**Change Summary Explanation**

MDSS 0604036A is not a New Start. MDSS received an initial \$39.625 million on PE 0603766A in FY 2021 and transitioned to 0604036A in FY 2022. The increase in funding from FY 2021 to FY 2022 supports continued SIGINT, SAR/MTI and architecture development and prototyping begun in FY 2021.

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army										<b>Date:</b> May 2021		
<b>Appropriation/Budget Activity</b> 2040 / 4					<b>R-1 Program Element (Number/Name)</b> PE 0604036A / Multi-Domain Sensing System (MDSS) Adv Dev				<b>Project (Number/Name)</b> BY9 / Multi-Domain Sensing System Adv Dev			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022 Base</b>	<b>FY 2022 OCO</b>	<b>FY 2022 Total</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>FY 2026</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
BY9: Multi-Domain Sensing System Adv Dev	-	-	-	50.548	-	50.548	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**Note**

MDSS 0604036A is not a New Start. MDSS received an initial \$39.625 million on PE 0603766A in FY 2021 and transitioned to 0604036A in FY 2022.

**A. Mission Description and Budget Item Justification**

The Multi Domain Sensing System (MDSS) will provide advanced aerial intelligence sensing capabilities for Multi-Domain Operations (MDO) against peer and near-peer adversaries. Initial MDSS development focuses on the High Accuracy Detection and Exploitation System (HADES), providing globally deployable, MDO-relevant sensing at extended ranges for indications and warnings, electronic order of battle, and patterns of life for the competition phase of MDO, and target development for the transition to conflict. In conflict, it will operate at standoff distances for survivability against enemy air defenses. HADES will comprise multi-faceted sensing on higher altitude, longer endurance fixed-wing aircraft that can provide effective stand-off from enemy anti-access/area denial systems. HADES sensors will include signals intelligence (SIGINT) (electronic intelligence (ELINT) and communications intelligence (COMINT)), and synthetic aperture radar (SAR)/moving target indicator (MTI) in its first increment. Future increments will add cyber/electronic warfare (EW) systems and use air-launched effects (ALE) to extend sensing ranges. These capabilities will enable ground commanders to detect, locate, identify, track, and target critical enemy assets on the ground, supporting tactical consumers like Long Range Precision Fires (LRPF).

FY 2022 base dollars in the amount of \$50.548 million support the continued development and prototyping of SIGINT and SAR/MTI sensors and Open Architecture to meet MDSS HADES requirements.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
<b>Title:</b> SAR/MTI Development and Prototyping	-	-	24.790
<b>Description:</b> SAR/MTI development and prototyping to expand sensor performance to address HADES requirements and ability to exploit near-peer threats.			
<b>FY 2022 Plans:</b> Development of software for Range Enhancement, Automatic Target Recognition (ATR), and Electronic Protection (EP) capability, continued development of prototypes, and conduct of experimentation, integration, and test.			
<b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> The increase in funding from FY 2021 to FY 2022 will continue SAR/MTI development and prototyping begun in FY 2021.			
<b>Title:</b> SIGINT Development and Prototyping	-	-	16.867

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army		<b>Date:</b> May 2021		
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604036A / Multi-Domain Sensing System (MDSS) Adv Dev	<b>Project (Number/Name)</b> BY9 / Multi-Domain Sensing System Adv Dev		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
<p><b>Description:</b> SIGINT development, prototyping, and demonstration to expand sensor performance and sensitivity to address HADES requirements and ability to exploit near-peer threats.</p> <p><b>FY 2022 Plans:</b> Development of SIGINT sensor enhancements to increase capability and sensor sensitivity to close identified HADES capability gaps while in parallel developing prototypes and conducting experimentation, integration, and test.</p> <p><b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> The increase in funding from FY 2021 to FY 2022 will support SIGINT development and prototyping following sensor demonstrations begun in FY 2021.</p>				
<p><b>Title:</b> Prototype Component Acquisition</p> <p><b>Description:</b> Acquisition of Communications, Processing and Workstation prototype components.</p> <p><b>FY 2022 Plans:</b> Acquire key communications, processing and workstation components for the prototype Mission Equipment Package.</p> <p><b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> The increase in funding from FY 2021 to FY 2022 will support acquisition of required Communications Equipment and Workstation prototype components in support of system integration and testing.</p>		-	-	2.017
<p><b>Title:</b> Architecture Development</p> <p><b>Description:</b> Development of the HADES integrated systems architecture to ensure end-to-end compatibility and sensor fusion.</p> <p><b>FY 2022 Plans:</b> Develop an Integrated systems architecture design to ensure all components functionally and physically integrate into the HADES system.</p> <p><b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> The increase in funding from FY 2021 to FY 2022 will support continued Architecture Development begun in FY 2021.</p>		-	-	2.284
<p><b>Title:</b> Engineering Support</p> <p><b>Description:</b> Engineering Support for MDSS development and prototype demonstration efforts.</p> <p><b>FY 2022 Plans:</b></p>		-	-	2.040

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604036A / Multi-Domain Sensing System (MDSS) Adv Dev	<b>Project (Number/Name)</b> BY9 / Multi-Domain Sensing System Adv Dev

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
Support SIGINT, SAR/MTI, and Open Architecture development, prototyping, and demonstration.			
<b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> The increase in funding from FY 2021 to FY 2022 is less than 10% for engineering support.			
<b>Title:</b> Program Management <b>Description:</b> Program Management support for MDSS development and prototype demonstration efforts.	-	-	2.550
<b>FY 2022 Plans:</b> Support SIGINT, SAR/MTI and Open Architecture development, prototyping, and demonstration. <b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> The increase in funding from FY 2021 to FY 2022 is less than 10% for engineering support.			
<b>Accomplishments/Planned Programs Subtotals</b>	-	-	50.548

<b>C. Other Program Funding Summary (\$ in Millions)</b>											
<u>Line Item</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022</u> <u>Base</u>	<u>FY 2022</u> <u>OCO</u>	<u>FY 2022</u> <u>Total</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>FY 2026</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• 0603766A: Tactical Electronic Surveillance System - Adv Dev	37.490	182.400	113.365	-	113.365	-	-	-	-	-	-

**Remarks**  
MDSS received an initial \$39.625 million on this line in FY2021 and transitioned to 0604036A in FY2022. MDSS 0604036A is not a New Start.

**D. Acquisition Strategy**  
MDSS development continues SIGINT and SAR/MTI sensor and open architecture development and prototyping efforts that were begun in FY 2021 on 0603766A Tactical Support Development - Adv Dev and transitioned in FY 2022 to 0604036A MDSS - Adv Dev. MDSS-HADES requirements were approved by the Army Requirements Oversight Council (AROC) on 26 August 2020 and signed by the Commanding General, Army Futures Command on 18 September 2020. An Acquisition Decision Memorandum directing sensor prototyping activities for HADES was signed on 16 November 2020. With the funding and acquisition authority allocated for HADES in FYs 2021 and 2022, the MDSS program office will pursue an agile acquisition strategy, maximizing prototyping and experimentation to choose best-of-breed sensors, and leveraging a non-proprietary, open system architecture to enable easy upgrades of software and hardware. The MDSS program office will take advantage of lessons learned from past and current quick reaction HADES-like capabilities to develop operational context and validate the capabilities described in the HADES requirements. These "path of learning" efforts, and others, will collectively inform HADES subsystem development and integration. The MDSS program's demonstration and development cycle will be executed in parallel to the path of learning above and will be informed by those efforts and related Army strategic decisions. Prototyping will include Soldier touchpoints throughout the process in order to help refine requirements. These Soldier touchpoints may include quick integration onto surrogate high altitude platforms to support operational exercise to gather real world data on sensor effectiveness.

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army** **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604036A / Multi-Domain Sensing System (MDSS) Adv Dev	<b>Project (Number/Name)</b> BY9 / Multi-Domain Sensing System Adv Dev
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<b>Management Services (\$ in Millions)</b>				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Engineering Support Services	TBD	ACC APG : APG, MD	-	-		-		2.040	Nov 2021	-		2.040	0.000	2.040	-
<b>Subtotal</b>			-	-		-		2.040		-		2.040	0.000	2.040	N/A

<b>Product Development (\$ in Millions)</b>				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
SAR/MTI Development and Prototyping	Various	TBD : TBD	-	-		-		24.790	Dec 2021	-		24.790	Continuing	Continuing	-
SIGINT Development and Prototyping	Various	ACC APG : APG, MD	-	-		-		16.867	Mar 2022	-		16.867	Continuing	Continuing	-
Prototype Component Acquisition	Various	ACC APG : APG, MD	-	-		-		2.017	Apr 2022	-		2.017	Continuing	Continuing	-
Architecture Development	TBD	AVMC : Redstone, AL	-	-		-		2.284	Dec 2021	-		2.284	Continuing	Continuing	-
<b>Subtotal</b>			-	-		-		45.958		-		45.958	Continuing	Continuing	N/A

<b>Support (\$ in Millions)</b>				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Program Management	RO	Various : APG, MD	-	-		-		2.550	Nov 2021	-		2.550	Continuing	Continuing	-
<b>Subtotal</b>			-	-		-		2.550		-		2.550	Continuing	Continuing	N/A

			Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
<b>Project Cost Totals</b>			-	-	0.000	50.548	-	50.548	Continuing	Continuing	N/A

**Remarks**

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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2022 Army</b>			<b>Date: May 2021</b>
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604036A / Multi-Domain Sensing System (MDSS) Adv Dev	<b>Project (Number/Name)</b> BY9 / Multi-Domain Sensing System Adv Dev	

Event Name	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
SAR/MTI Development and Prototyping																												
HADES Systems Architecture Development																												
SIGINT Sensor Evaluation																												
SIGINT Development and Prototyping																												
System Integration and Test																												
Military User Assessment																												

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604036A / <i>Multi-Domain Sensing System (MDSS) Adv Dev</i>	<b>Project (Number/Name)</b> BY9 / <i>Multi-Domain Sensing System Adv Dev</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
SAR/MTI Development and Prototyping	2	2021	3	2023
HADES Systems Architecture Development	2	2021	2	2023
SIGINT Sensor Evaluation	3	2021	2	2022
SIGINT Development and Prototyping	2	2022	4	2023
System Integration and Test	3	2023	3	2024
Military User Assessment	4	2024	4	2025



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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2022 Army **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040: Research, Development, Test & Evaluation, Army / BA 4: Advanced Component Development & Prototypes (ACD&P)	<b>R-1 Program Element (Number/Name)</b> PE 0604037A / Tactical Intel Targeting Access Node (TITAN) Adv Dev
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	-	-	-	28.347	-	28.347	-	-	-	-	-	-
BY4: Tactical Intelligence Targeting Access Node	-	-	-	28.347	-	28.347	-	-	-	-	-	-

**Note**

TITAN Ground Station funding transitioned from PE 0305208A to PE 0604037A Tactical Intel Targeting Access Node (TITAN) Adv Dev in FY 2022. This is not a new start.

**A. Mission Description and Budget Item Justification**

TITAN is a scalable and expeditionary intelligence ground station that supports commanders across the entire Multi-Domain Operations (MDO)/Joint All Domain Operations (JADO) battlefield framework with capabilities tailored to echelon. TITAN leverages Space, High Altitude, Aerial and Terrestrial layer sensors to provide targetable data to fires networks as well as multi-discipline intelligence support to targeting and Situation Awareness/Situation Understanding (SA/SU) in support of mission command.

TITAN is the future Army Intelligence, Surveillance, and Reconnaissance (ISR) ground station that will consolidate the sensor processing capabilities in the current Distributed Common Ground System-Army (DCGS-A) Operational-Intelligence Ground Station (OGS), Tactical-Intelligence Ground Station (TGS), the Advanced Miniaturized Data Acquisition System Dissemination Vehicle (ADV) and the Remote Ground Terminal (RGT). Additionally, TITAN will have the access and sensor tasking or control capabilities of the future Tactical Space Layer assets, National assets, the Multi-Domain Sensing Systems (MDSS) as well as commercial overhead sensors. Consequently, the TITAN ground station will be able to conduct deep sensing operations with the abilities to Task, Collect, Process, Exploit, and Disseminate (TCPED) information from Space, High Altitude, Aerial, and Terrestrial Layer sensors in support of Long Range Precision Fires (LRPF) operations.

<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022 Base</b>	<b>FY 2022 OCO</b>	<b>FY 2022 Total</b>
Previous President's Budget	0.000	0.000	0.000	-	0.000
Current President's Budget	0.000	0.000	28.347	-	28.347
Total Adjustments	0.000	0.000	28.347	-	28.347
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	-	-	28.347	-	28.347

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040: <i>Research, Development, Test &amp; Evaluation, Army / BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0604037A / <i>Tactical Intel Targeting Access Node (TITAN) Adv Dev</i>	
<b><u>Change Summary Explanation</u></b> TITAN Ground Station funding transitioned from PE 0305208A to PE 0604037A Tactical Intel Targeting Access Node (TITAN) Adv Dev in FY 2022.		

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army										<b>Date:</b> May 2021		
<b>Appropriation/Budget Activity</b> 2040 / 4					<b>R-1 Program Element (Number/Name)</b> PE 0604037A / <i>Tactical Intel Targeting Access Node (TITAN) Adv Dev</i>				<b>Project (Number/Name)</b> BY4 / <i>Tactical Intelligence Targeting Access Node</i>			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022 Base</b>	<b>FY 2022 OCO</b>	<b>FY 2022 Total</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>FY 2026</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
BY4: <i>Tactical Intelligence Targeting Access Node</i>	-	-	-	28.347	-	28.347	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**Note**

TITAN Ground Station funding transitioned from PE 0305208A to PE 0604037A Tactical Intel Targeting Access Node (TITAN) Adv Dev in FY 2022. This is not a new start.

**A. Mission Description and Budget Item Justification**

TITAN directly addresses the U.S. Army Combined Arms Center's (USACAC) Multi-Domain Operations (MDO) Gap #1: Lack of echelons above corps (EAC) multi-domain deep sensing, analysis, and processing, exploitation and dissemination (PED) for indications & warning (I&W) and anti-access/area denial (A2/AD) targeting. Furthermore, TITAN indirectly addresses MDO Gap 2: No theater detect, decide, deliver, assess (D3A) and convergence of Long Range Precision Fires (LRPF) to disintegrate A2/AD and MDO Gap #3: Lack of EAC LRPF capacity to dis-integrate A2/AD and shape the deep fight. TITAN supports these MDO gaps by providing the sensor data receipt and control, analysis, exploitation, and dissemination functions needed to enable LRPF. The system is postured to provide the fighting force with improved capacity and capability to "stimulate, see, and strike the enemy."

The FY22 funds in the amount of \$28.698M will fund initial Prototyping and Advanced Development of TITAN critical technologies on a representative platform. Efforts will prototype high altitude, aerial and terrestrial sensor data feeds and processing. Funds will support technology maturation of critical TITAN technologies including: hyper-computing, Artificial Intelligence/Machine Learning (AI/ML), Multi-Link Antennas and CMOSS.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
<b>Title:</b> Development and Prototyping of Critical RF Technologies	-	-	15.721
<b>Description:</b> Fund initial Prototyping and Advanced Development of TITAN critical technologies on a representative platform. Development and prototyping of critical RF technologies and technology which currently does not exist or needs significant enhancements to meet TITAN requirements. Fund technology maturation and prototyping of critical TITAN RF technologies including Multi-Link Antennas and CMOSS implementations. Multi-link RF systems will support the simultaneous ingest of multiple sensor data streams in a tactical configuration/footprint Prototype high altitude, aerial and terrestrial sensor data feeds.			
<b>FY 2022 Plans:</b>			

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604037A / <i>Tactical Intel Targeting Access Node (TITAN) Adv Dev</i>	<b>Project (Number/Name)</b> BY4 / <i>Tactical Intelligence Targeting Access Node</i>

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
Fund initial Prototyping and Advanced Development of TITAN critical RF technologies on a representative platform. Prototype high altitude, aerial and terrestrial sensor data feeds and processing. Fund technology maturation of critical TITAN technologies to include Multi-Link Antennas and CMOSS.  <b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> TITAN Ground Station funding transitioned from PE 0305208A to PE 0604037A Tactical Intel Targeting Access Node (TITAN) Adv Dev in FY 2022.			
<b>Title:</b> Development and Prototyping of Critical Automated Processing Technologies  <b>Description:</b> Fund technology maturation of critical TITAN processing technologies including hyper-computing solutions, AI/ML algorithms to enhance targeting automation, stimulation capabilities and the generation of ML training data. Fund maturation of existing technology that needs minor enhancements to meet Army needs. This includes AI/ML algorithms that will transition to TITAN from various programs across the DoD and IC and need to be tuned for Army use cases. Fund the generation of new training data to aid in automated targeting. Funding will be used to integrate other technology transitioned from the research and development centers across the army to increase the accuracy and precision of TITAN. Existing modeling and simulation tools will be enhanced to account for the additional sensor modalities (EO/IR/SAR/FMV) that TITAN needs to process, which will allow the PM to automate more of the testing at the same time allowing units to run their own training exercises to maintain proficiency.  <b>FY 2022 Plans:</b> Fund initial Prototyping and Advanced Development of TITAN critical technologies on a representative platform. Prototype high altitude, aerial and terrestrial sensor data feeds and processing. Fund technology maturation of critical TITAN technologies including hyper-computing and AI/ML algorithms.  <b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> TITAN Ground Station funding transitioned from PE 0305208A to PE 0604037A Tactical Intel Targeting Access Node (TITAN) Adv Dev in FY 2022.	-	-	12.626
<b>Accomplishments/Planned Programs Subtotals</b>	-	-	28.347

<b>C. Other Program Funding Summary (\$ in Millions)</b>											
<u>Line Item</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022</u> <u>Base</u>	<u>FY 2022</u> <u>OCO</u>	<u>FY 2022</u> <u>Total</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>FY 2026</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• BY5: <i>Tactical Intelligence Targeting Access Node EMD</i>	-	-	54.972	-	54.972	-	-	-	-	-	-
<b>Remarks</b>	PE 0305208A is being leveraged for FY20 (\$715K) and FY21 Ground Station Modernization activities (\$18,000K).										

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604037A / <i>Tactical Intel Targeting Access Node (TITAN) Adv Dev</i>	<b>Project (Number/Name)</b> BY4 / <i>Tactical Intelligence Targeting Access Node</i>

**C. Other Program Funding Summary (\$ in Millions)**

<u>Line Item</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022</u> <u>Base</u>	<u>FY 2022</u> <u>OCO</u>	<u>FY 2022</u> <u>Total</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>FY 2026</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
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FY22 funds realign from PE 0305208A to PE 0604037A Tactical Intel Targeting Access Node (TITAN) Adv Dev in FY 2022.

**D. Acquisition Strategy**

The TITAN program acquisition strategy is to leverage Section 804 Middle-Tier Acquisition (MTA) policy for rapid prototyping program (RPP). This RPP rapidly develops and fields a capability that address multi-domain operations gap that can be demonstrated in an operational environment informing a decision point to transition to Rapid Fielding effort or tailored Milestone C for production. TITAN ground station fielding will be accelerated with this approach while providing increased intelligence capabilities, additional sensor data and processing throughput over time. The MTA approval will be based on an Abbreviated CDD (A-CDD) with an AROC anticipated in third of FY21, followed by the MTA decision in fourth quarter FY21.

An Other Transaction Authority (OTA) contract will be pursued under the 10 U.S.C. 2371b and the 2016 National Defense Authorization Act (NDAA), Section 815, for TITAN Rapid Prototype and Production. This innovative approach will enable acceleration of the TITAN Ground Station capabilities to the Warfighter.

The TITAN OTA approach is a multi-phased contract vehicle designed to scope each phase separately based on maturing requirements and informed by risk reduction efforts in prior phases.

Phase I, Ground Station Modernization, is a competitive effort in FY21 between two vendors to build system-level designs and mature a SW baseline. At the conclusion of Phase I, a Tech Demo and Critical Design Review (CDR) will inform up-select to one vendor for Phase 2. Phase 2 will be executed starting in FY22 and encompass efforts such as prototyping and development of TITAN critical technologies identified during Phase I, and inform the later Phase 3 (additional Echelon build and integration) and 4 (enhancements and scalability builds) activities. The OTA allows the flexibility for each phase to be executed either in parallel or sequentially.

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<b>Exhibit R-3, RDT&amp;E Project Cost Analysis: PB 2022 Army</b>												<b>Date: May 2021</b>			
<b>Appropriation/Budget Activity</b> 2040 / 4				<b>R-1 Program Element (Number/Name)</b> PE 0604037A / <i>Tactical Intel Targeting Access Node (TITAN) Adv Dev</i>				<b>Project (Number/Name)</b> BY4 / <i>Tactical Intelligence Targeting Access Node</i>							
<b>Product Development (\$ in Millions)</b>															
				<b>FY 2020</b>		<b>FY 2021</b>		<b>FY 2022 Base</b>		<b>FY 2022 OCO</b>		<b>FY 2022 Total</b>			
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
Development and Prototyping of Critical RF Technologies	C/FP	Contractor (Pending Selection) : PEO IEW&S (APG) and Contractor Facility (TBD)	-	-		-		15.721	Nov 2021	-		15.721	Continuing	Continuing	Continuing
<b>Subtotal</b>			-	-		-		15.721		-		15.721	Continuing	Continuing	N/A
<b>Support (\$ in Millions)</b>															
				<b>FY 2020</b>		<b>FY 2021</b>		<b>FY 2022 Base</b>		<b>FY 2022 OCO</b>		<b>FY 2022 Total</b>			
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
Development and Prototyping of Critical Automated Processing Technologies	C/FP	Contractor (Pending Selection) : Various: APG, Ft. Bragg, JBLM, YPG, CTR FAC (TBD)	-	-		-		12.626	Nov 2021	-		12.626	Continuing	Continuing	Continuing
<b>Subtotal</b>			-	-		-		12.626		-		12.626	Continuing	Continuing	N/A
<b>Project Cost Totals</b>			-	-		0.000		28.347		-		28.347	Continuing	Continuing	N/A
<b>Remarks</b>															

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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2022 Army</b>		<b>Date: May 2021</b>
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604037A / <i>Tactical Intel Targeting Access Node (TITAN) Adv Dev</i>	<b>Project (Number/Name)</b> BY4 / <i>Tactical Intelligence Targeting Access Node</i>

Event Name	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
MDD		▲ 1																										
Analysis of Alternatives			■																									
AoA SAG					▲ 2																							
AROC							▲ 3																					
MTA								▲ 4																				
OTA Phase 1: Ground Station Modernization						■																						
Phase 1 Technology Demonstrations/Design Reviews						■																						
CDR									▲ 5																			
OTA Phase 2: Prototyping and Critical Technology Development										■																		
Phase 2 Testing (Multiple DT Events/OA)										■																		
OT Complete															▲ 6													
OTA Phase 3: Tailoring by Echelon														■														
Phase 3 Testing (Multiple DT Events/OA)														■														

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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2022 Army</b>		<b>Date: May 2021</b>
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604037A / <i>Tactical Intel Targeting Access Node (TITAN) Adv Dev</i>	<b>Project (Number/Name)</b> BY4 / <i>Tactical Intelligence Targeting Access Node</i>

Event Name	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026																							
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4																				
OTA Phase 4: Joint Sensor Integration, Continuous Integration and Updates																																																
Production Decision																																					7											
Production Contract																																																
Follow-on OTA Contract																																																



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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604037A / <i>Tactical Intel Targeting Access Node (TITAN) Adv Dev</i>	<b>Project (Number/Name)</b> BY4 / <i>Tactical Intelligence Targeting Access Node</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
MDD	2	2020	2	2020
Analysis of Alternatives	3	2020	1	2021
AoA SAG	1	2021	1	2021
AROC	3	2021	3	2021
MTA	4	2021	4	2021
OTA Phase 1: Ground Station Modernization	1	2021	1	2022
Phase 1 Technology Demonstrations/Design Reviews	1	2021	1	2022
CDR	1	2022	1	2022
OTA Phase 2: Prototyping and Critical Technology Development	1	2022	2	2023
Phase 2 Testing (Multiple DT Events/OA)	1	2022	2	2023
OT Complete	3	2023	3	2023
OTA Phase 3: Tailoring by Echelon	4	2022	2	2024
Phase 3 Testing (Multiple DT Events/OA)	4	2022	2	2024
OTA Phase 4: Joint Sensor Integration, Continuous Integration and Updates	1	2024	4	2025
Production Decision	4	2023	4	2023
Production Contract	1	2024	1	2025
Follow-on OTA Contract	1	2025	4	2026

**Note**

Schedule Detail notes.

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**Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Army** **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040: <i>Research, Development, Test &amp; Evaluation, Army / BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0604100A / <i>Analysis Of Alternatives</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	-	9.811	9.714	10.091	-	10.091	-	-	-	-	-	-
EC7: <i>Analysis Of Alternatives</i>	-	9.811	9.714	10.091	-	10.091	-	-	-	-	-	-

**A. Mission Description and Budget Item Justification**

This Program Element (PE) provides funding for analytical support of Analysis of Alternatives. Analyses of Alternatives are statutory requirements for Major Defense Acquisition Programs and regulatory for all other programs. Based on Department of Defense Instruction (DoDI) 5000.02, Analyses of Alternatives are required to be completed for a new start program prior to its first Milestone Decision. The PE provides analytical capability for Pre-Milestone A programs that emerge outside the normal budget or POM cycles. Normally these programs are without program managers and require analysis to support Congressional, Defense and Army Senior Leader's requirement and acquisition needs and priorities. The Analyses of Alternatives support the preparation of the Capability Development Document, Key Performance Parameters and Thresholds values and tradeoff analysis. The cited work is consistent with the Army Futures Command Science and Technology priority focus areas and the Army Modernization Strategy and Guidance. Work in this PE is performed by analytical agencies such as The Research and Analysis Center and Data and Analysis Center. The Army is projecting to start work on multiple Analyses of Alternatives beginning in Fiscal Year (FY) 2022, and will assess and fund the highest Congressional, Defense and Army Senior Leader's priorities during the year of execution.

<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022 Base</b>	<b>FY 2022 OCO</b>	<b>FY 2022 Total</b>
Previous President's Budget	10.023	10.082	10.216	-	10.216
Current President's Budget	9.811	9.714	10.091	-	10.091
Total Adjustments	-0.212	-0.368	-0.125	-	-0.125
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	0.200	-			
• SBIR/STTR Transfer	-0.412	-0.368			
• Adjustments to Budget Years	-	-	-0.125	-	-0.125

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army										<b>Date:</b> May 2021		
<b>Appropriation/Budget Activity</b> 2040 / 4					<b>R-1 Program Element (Number/Name)</b> PE 0604100A / <i>Analysis Of Alternatives</i>				<b>Project (Number/Name)</b> EC7 / <i>Analysis Of Alternatives</i>			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022 Base</b>	<b>FY 2022 OCO</b>	<b>FY 2022 Total</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>FY 2026</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
<i>EC7: Analysis Of Alternatives</i>	-	9.811	9.714	10.091	-	10.091	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

This Program Element (PE) provides funding for analytical support of Analysis of Alternatives. Analyses of Alternatives are statutory requirements for Major Defense Acquisition Programs and regulatory for all other programs. Based on Department of Defense Instruction (DoDI) 5000.02, Analyses of Alternatives are required to be completed for a new start program prior to its first Milestone Decision. The PE provides analytical capability for Pre-Milestone A programs that emerge outside the normal budget or POM cycles. Normally these programs are without program managers and require analysis to support Congressional, Defense and Army Senior Leader's requirement and acquisition needs and priorities. The Analyses of Alternatives support the preparation of the Capability Development Document, Key Performance Parameters and Thresholds values and tradeoff analysis. The cited work is consistent with the Army Futures Command Science and Technology priority focus areas and the Army Modernization Strategy and Guidance. Work in this PE is performed by analytical agencies such as The Research and Analysis Center and Data and Analysis Center. The Army is projecting to start work on multiple Analyses of Alternatives beginning in Fiscal Year (FY) 2022, and will assess and fund the highest Congressional, Defense and Army Senior Leader's priorities during the year of execution.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
<b>Title:</b> Analysis of Alternatives	9.811	9.714	10.091
<b>Description:</b> This Project provides funding for analytical support for efforts such as: Common Tactical Truck, Ship to Shore Logistics Vessel, and Future Main Battle Tank. In additional, several Analyses of Alternatives started in FY 2021 will continue to require analysis funding into FY 2022, to include the High Accuracy Detection and Exploitation System, Next Generation Combat Vehicle Cross-Functional Team Robotic Combat Vehicle, and Project Convergence.			
<b>FY 2021 Plans:</b> FY 2021 funding supports analysis for new start programs that do not yet have a program manager assigned and to augment program manager funds where requirement decisions drive changes in scope or increased fidelity to achieve Congressional, Defense and Army Senior Leader's priority intent and interest. The analysis initiation, scope, and fidelity are determined in accordance with the U.S. Army Future Command processes prior to the Materiel Development Decision and synchronized to support Joint and Army Requirement Oversight Councils (JROC and AROC) and Acquisition Executive/Program decisions.			
<b>FY 2022 Plans:</b> FY 2022 funding supports analysis for new start programs that do not yet have a program manager assigned and to augment program manager funds where requirement decisions drive changes in scope or increased fidelity to achieve Congressional, Defense and Army Senior Leader's priority intent and interest. The analysis initiation, scope, and fidelity are determined in			

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army	<b>Date:</b> May 2021
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<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604100A / <i>Analysis Of Alternatives</i>	<b>Project (Number/Name)</b> EC7 / <i>Analysis Of Alternatives</i>
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<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	FY 2020	FY 2021	FY 2022
accordance with the U.S. Army Future Command processes prior to the Materiel Development Decision and synchronized to support Joint and Army Requirement Oversight Councils (JROC and AROC) and Acquisition Executive/Program decisions.			
<b><i>FY 2021 to FY 2022 Increase/Decrease Statement:</i></b> Minor economic adjustments.			
<b>Accomplishments/Planned Programs Subtotals</b>	9.811	9.714	10.091

**C. Other Program Funding Summary (\$ in Millions)**  
N/A

**Remarks**

**D. Acquisition Strategy**  
N/A



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**Exhibit R-4, RDT&E Schedule Profile: PB 2022 Army** **Date: May 2021**

<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604100A / <i>Analysis Of Alternatives</i>	<b>Project (Number/Name)</b> EC7 / <i>Analysis Of Alternatives</i>
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Event Name	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Issue FY19 AoA Funding																												
Identify Candidates for FY20 AoA funding																												
Issue FY 20 AoA Funding																												
Identify Candidates for FY21 AoA funding																												
Issue FY 21 AoA Funding																												
Identify Candidates for FY22 AoA funding																												
Issue FY 22 AoA Funding																												

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**Exhibit R-4A, RDT&E Schedule Details:** PB 2022 Army **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604100A / <i>Analysis Of Alternatives</i>	<b>Project (Number/Name)</b> EC7 / <i>Analysis Of Alternatives</i>
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Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Identify Candidates for FY19 AoA funding	4	2018	3	2019
Issue FY19 AoA Funding	1	2020	4	2020
Identify Candidates for FY20 AoA funding	4	2019	3	2020
Issue FY 20 AoA Funding	1	2020	4	2020
Identify Candidates for FY21 AoA funding	4	2020	3	2021
Issue FY 21 AoA Funding	1	2021	4	2021
Identify Candidates for FY22 AoA funding	4	2021	3	2022
Issue FY 22 AoA Funding	1	2022	4	2022

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2022 Army **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040: <i>Research, Development, Test &amp; Evaluation, Army / BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0604101A / <i>Small Unmanned Aerial Vehicle (SUAV) (6.4)</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	-	-	1.328	0.926	-	0.926	-	-	-	-	-	-
BR6: <i>Small Unmanned Aircraft System (6.4)</i>	-	-	1.328	0.926	-	0.926	-	-	-	-	-	-

**A. Mission Description and Budget Item Justification**

The Rucksack Portable Unmanned Aircraft System (RPUAS) Family of Small Unmanned Aircraft System (FoSUAS) provides battalion and below ground maneuver elements with critical situational awareness and enhanced force protection. The system provides the small unit commander an organic and responsive reconnaissance and targeting capability with real-time Full Motion Video and sensor data. Other compatible receivers, such as the One System Remote Video Terminal and appropriately equipped manned platforms may also receive the FoSUAS products.

The RPUAS FoSUAS provides the battalion and below ground maneuver elements with an organic, on-demand, asset to develop situational awareness, enhance force protection, and secure routes, points, and areas. The system provides the small unit commander an organic and responsive reconnaissance and targeting capability with real-time Full Motion Video and sensor data. The RPUAS FoSUAS includes a combination of three separate hand-launched mission specific configurable aircraft that do not require an improved launch/recovery. The three separate mission specific configurable Unmanned Aircraft (UA) are the Short Range Reconnaissance (SRR), the Medium Range Reconnaissance (MRR), and the Long Range Reconnaissance (LRR). In addition to the aircraft, the system contains ground control equipment, which includes an interoperable handheld ground control station (H-GCS) which incorporates the Tactical Open Government Owned Architecture (TOGA). FoSUAS will utilize existing RQ-11 in a system of systems fielding concept, with SRR and LRR options under development.

Justification: FY 2022 Research, Development, Test, and Evaluation (RDT&E) Base funding of \$0.926 million to meet Capabilities Production Document (CPD) Increment II Block II related requirements. Specifically, to conduct advanced component development activities for SRR, and efforts to evaluate systems in high fidelity and realistic operating environments.



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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2022 Army	<b>Date:</b> May 2021
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<b>Appropriation/Budget Activity</b> 2040: <i>Research, Development, Test &amp; Evaluation, Army / BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0604101A / <i>Small Unmanned Aerial Vehicle (SUAV) (6.4)</i>
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<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022 Base</b>	<b>FY 2022 OCO</b>	<b>FY 2022 Total</b>
Previous President's Budget	0.000	1.378	1.387	-	1.387
Current President's Budget	0.000	1.328	0.926	-	0.926
Total Adjustments	0.000	-0.050	-0.461	-	-0.461
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-0.050			
• Adjustments to Budget Years	-	-	-0.461	-	-0.461

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**Exhibit R-2A, RDT&E Project Justification:** PB 2022 Army **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4					<b>R-1 Program Element (Number/Name)</b> PE 0604101A / <i>Small Unmanned Aerial Vehicle (SUAV) (6.4)</i>				<b>Project (Number/Name)</b> BR6 / <i>Small Unmanned Aircraft System (6.4)</i>			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022 Base</b>	<b>FY 2022 OCO</b>	<b>FY 2022 Total</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>FY 2026</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
BR6: <i>Small Unmanned Aircraft System (6.4)</i>	-	-	1.328	0.926	-	0.926	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**Note**

Funding has been reprogrammed to Program Element (PE) 0604101A Small Unmanned Aerial Vehicle (SUAV) (6.4) from PE 0305232A Project RA7 RQ-11 UAV starting in FY 2021.

**A. Mission Description and Budget Item Justification**

The Family of Small Unmanned Aircraft System (FoSUAS) provides battalion and below ground maneuver elements with critical situational awareness and enhanced force protection. The system provides the small unit commander an organic and responsive reconnaissance and targeting capability with real-time Full Motion Video and sensor data. Other compatible receivers, such as the One System Remote Video Terminal and appropriately equipped manned platforms may also receive the FoSUAS products.

The Rucksack Portable Unmanned Aircraft Systems (RPUAS) FoSUAS provides the battalion and below ground maneuver elements with an organic, on-demand, asset to develop situational awareness, enhance force protection, and secure routes, points, and areas. The system provides the small unit commander an organic and responsive reconnaissance and targeting capability with real-time Full Motion Video and sensor data. The RPUAS FoSUAS includes a combination of three separate hand-launched mission specific configurable aircraft that do not require an improved launch/recovery. The three separate mission specific configurable Unmanned Aircraft (UA) are the Short Range Reconnaissance (SRR), the Medium Range Reconnaissance (MRR), and the Long Range Reconnaissance (LRR). In addition to the aircraft, the system contains ground control equipment, which includes an interoperable handheld ground control station (H-GCS) which incorporates the Tactical Open Government Owned Architecture (TOGA). FoSUAS will utilize existing RQ-11 in a system of systems fielding concept, with SRR and LRR options under development.

Justification: FY 2022 Research, Development, Test, and Evaluation (RDT&E) Base funding of \$0.926 million to meet Capabilities Production Document (CPD) Increment II Block II related requirements. Specifically, to conduct advanced component development activities for SRR prototype systems in high fidelity and realistic operating environments.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	FY 2020	FY 2021	FY 2022
<b>Title:</b> Component Development and Integration	-	0.542	0.400
<b>Description:</b> Engineering to develop advanced components for and integrate new components into SRR.			
<b>FY 2021 Plans:</b>			

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army	<b>Date:</b> May 2021
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<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604101A / <i>Small Unmanned Aerial Vehicle (SUAV) (6.4)</i>	<b>Project (Number/Name)</b> BR6 / <i>Small Unmanned Aircraft System (6.4)</i>
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<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	FY 2020	FY 2021	FY 2022
Advanced component development efforts for SRR. <b>FY 2022 Plans:</b> Advanced component development efforts for SRR. <b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> Anticipated increase in cost of radios, components for Tranche 2.			
<b>Title:</b> System Engineering Program Management <b>Description:</b> System Engineering Program Management support during development and integration of components for SRR air vehicles. <b>FY 2021 Plans:</b> System Engineering and Program Management support of advanced component development activities for SRR. <b>FY 2022 Plans:</b> System Engineering and Program Management support of advanced component development activities for SRR. <b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> SEPM effort is transitioning to PE 0605205 (6.5)	-	0.136	0.069
<b>Title:</b> System Test and Evaluation <b>Description:</b> Testing to Evaluate components for the SRR air vehicle. <b>FY 2021 Plans:</b> Testing to evaluate efforts to develop and integrate components for SRR air vehicles. <b>FY 2022 Plans:</b> Testing to evaluate efforts and to develop and integrate components for SRR. <b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> Components for SRR Tranche 2 are completing evaluation.	-	0.650	0.457
<b>Accomplishments/Planned Programs Subtotals</b>	-	1.328	0.926

<b>C. Other Program Funding Summary (\$ in Millions)</b>											
Line Item	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
• RA7: RQ-11 Raven	3.218	-	-	-	-	-	-	-	-	-	-

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army	<b>Date:</b> May 2021
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<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604101A / <i>Small Unmanned Aerial Vehicle (SUAV) (6.4)</i>	<b>Project (Number/Name)</b> BR6 / <i>Small Unmanned Aircraft System (6.4)</i>
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**C. Other Program Funding Summary (\$ in Millions)**

<u>Line Item</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022</u> <u>Base</u>	<u>FY 2022</u> <u>OCO</u>	<u>FY 2022</u> <u>Total</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>FY 2026</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• BR7: <i>Small Unmanned Aircraft System (6.5)</i>	-	5.780	2.275	-	2.275	-	-	-	-	-	-
• A00010: <i>SMALL UNMANNED AIRCRAFT SYSTEM</i>	21.420	16.551	16.005	-	16.005	-	-	-	-	-	-

**Remarks**

Funding has been reprogrammed to PE 0604101A Small Unmanned Aerial Vehicle (SUAV) (6.4) from PE 0305232A Project RA7 RQ-11 UAV starting in FY 2021.

**D. Acquisition Strategy**

N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army												Date: May 2021			
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)							
2040 / 4				PE 0604101A / Small Unmanned Aerial Vehicle (SUAV) (6.4)				BR6 / Small Unmanned Aircraft System (6.4)							
Management Services (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
System Engineering Program Management	Various	Various : Various	-	-		0.136		0.069		-		0.069	Continuing	Continuing	Continuing
<b>Subtotal</b>			-	-		0.136		0.069		-		0.069	Continuing	Continuing	N/A
Product Development (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Component development and Integration	Various	ACC Redstone : Redstone Arsenal	-	-		0.542	Jun 2021	0.400	Jun 2022	-		0.400	Continuing	Continuing	Continuing
<b>Subtotal</b>			-	-		0.542		0.400		-		0.400	Continuing	Continuing	N/A
Test and Evaluation (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
System Test and Evaluation	Various	ACC Redstone : Redstone Arsenal	-	-		0.650	Aug 2021	0.457	Aug 2022	-		0.457	Continuing	Continuing	Continuing
<b>Subtotal</b>			-	-		0.650		0.457		-		0.457	Continuing	Continuing	N/A
<b>Project Cost Totals</b>			-	-		1.328		0.926		-		0.926	Continuing	Continuing	N/A
<b>Remarks</b>															


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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2022 Army</b>		<b>Date: May 2021</b>
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604101A / <i>Small Unmanned Aerial Vehicle (SUAV) (6.4)</i>	<b>Project (Number/Name)</b> BR6 / <i>Small Unmanned Aircraft System (6.4)</i>

Event Name	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Systems Engineering Program Management (SEPM)	[Blue bar]																											
Test and Evaluation	[Blue bar]																											
SRR/HGCS Integration	[Blue bar]																											
SRR Tranche I End User Assessment	[Blue bar]																											
SRR Tranche I Full Rate Production (FRP) Decision	[Blue bar]																											
SRR Tranche II OTA Award	[Blue bar]																											
SRR Tranche II Prototyping	[Blue bar]																											
SRR Tranche II End User Assessment	[Blue bar]																											
SRR Tranche II FRP Decision	[Blue bar]																											
SRR Tranche III	[Blue bar]																											
LRR OTA Award (Component)	[Blue bar]																											
LRR Prototyping (System)	[Blue bar]																											
LRR/HGCS Integration	[Blue bar]																											

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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2022 Army</b>			<b>Date: May 2021</b>		
<b>Appropriation/Budget Activity</b> 2040 / 4		<b>R-1 Program Element (Number/Name)</b> PE 0604101A / <i>Small Unmanned Aerial Vehicle (SUAV) (6.4)</i>		<b>Project (Number/Name)</b> BR6 / <i>Small Unmanned Aircraft System (6.4)</i>	

Event Name	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
LRR End User Assessment																									 LRR EUA			

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<b>Exhibit R-4A, RDT&amp;E Schedule Details: PB 2022 Army</b>		<b>Date: May 2021</b>
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604101A / <i>Small Unmanned Aerial Vehicle (SUAV) (6.4)</i>	<b>Project (Number/Name)</b> BR6 / <i>Small Unmanned Aircraft System (6.4)</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Tactical Open Government Owned Architecture Development	4	2014	4	2014
Tactical Open Government Architecture Test Event 2	3	2015	3	2015
Systems Engineering Program Management (SEPM)	2	2018	4	2024
SRR Tranche I OTA Award	3	2019	3	2019
SRR Tranche I Prototyping	3	2018	4	2019
Test and Evaluation	4	2018	4	2024
SRR/HGCS Integration	2	2018	4	2020
SRR Tranche I End User Assessment	4	2020	4	2020
SRR Tranche I Full Rate Production (FRP) Decision	3	2021	3	2021
SRR Tranche II OTA Award	4	2021	4	2021
SRR Tranche II Prototyping	4	2021	4	2022
SRR Tranche II End User Assessment	4	2022	4	2022
SRR Tranche II FRP Decision	1	2023	1	2023
SRR Tranche III	1	2023	4	2024
LRR OTA Award (Component)	4	2023	4	2024
LRR Prototyping (System)	4	2024	1	2026
LRR/HGCS Integration	4	2024	4	2026
LRR End User Assessment	3	2026	3	2026
LRR FRP Decision	2	2027	2	2027

**Note**  
Funding has been moved to this PE 0305232A Project RA7 RQ-11 UAV starting in FY 2021.



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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2022 Army **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040: <i>Research, Development, Test &amp; Evaluation, Army / BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0604113A / <i>Future Tactical Unmanned Aircraft System (FTUAS)</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	-	40.745	57.083	69.697	-	69.697	-	-	-	-	-	-
EX8: <i>Future Unmanned Aircraft System (FUAS)</i>	-	40.745	57.083	69.697	-	69.697	-	-	-	-	-	-

**A. Mission Description and Budget Item Justification**

The Future Unmanned Aircraft System (FUAS) is a critical system in the Multi-Domain Operations (MDO) concept that will employ MDO capabilities at all echelons and allow ground based forces to project power from land into other domains to defeat highly capable enemies, secure terrain, and consolidate gains. FUAS encompasses an array of capabilities from platoon soldiers to Division Commanders. The Army Requirements Oversight Council (AROC) approved the FUAS Initial Capabilities Document (ICD) on 6 Mar 2019. The FUAS ICD includes requirements for Future Tactical UAS (FTUAS), Air Launched Effects (ALE), and Scalable Control Interface (SCI). Manned, optionally-manned, and unmanned systems will penetrate defense-in-depth environments by employing ALE with teaming and swarming effects to detect, decoy, jam radar and communications, conduct cyber-attack, spoof and jam Global Positioning System (GPS), and kinetic engagement.

The Future Vertical Lift Cross Functional Team (FVL CFT) FUAS line of effort is comprised of multiple components including the FTUAS for the Brigade Combat Team (BCT), and ALE. The FTUAS seeks to replace the RQ-7Bv2 Shadow assets within the BCTs. Key attributes of the FTUAS BCT focus on Rapid Deployability, Expeditionary Maneuver, and Mobility for adaptive and agile operations. FTUAS will consist of an aircraft subsystem that will include the airframe, propulsion, avionics, communications, navigation, and software systems; aircraft-specific ground support equipment including power generation, transportation, or command and control equipment; aircraft software; and required engineering, logistics, programmatic support.

ALE extends tactical and operational reach, lethality, and protection to the advanced team as an attritable or optionally recoverable aerial capability that detects, identifies, locates, and reports threats; represents a credible decoy; disrupts threat communication, targeting and acquisition systems; and delivers lethal and non-lethal effects against those threats across Multi-Domain Operations.

Justification: Fiscal Year (FY) 2022 FTUAS Research Development Technology & Evaluation (RDT&E) Base funding of \$69.944 million will be utilized for the following:

- 1) \$36.444 million to support FTUAS component development,
- 2) \$12.000 million to initiate FTUAS competitive prototyping and integration efforts,
- 3) \$20.000 million to support ALE Systems Analysis,
- 4) \$1.500 million provides Systems Engineering and Program Management (SEPM) to support FTUAS

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2022 Army	<b>Date:</b> May 2021
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<b>Appropriation/Budget Activity</b> 2040: <i>Research, Development, Test &amp; Evaluation, Army / BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0604113A / <i>Future Tactical Unmanned Aircraft System (FTUAS)</i>
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<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022 Base</b>	<b>FY 2022 OCO</b>	<b>FY 2022 Total</b>
Previous President's Budget	40.745	40.083	45.239	-	45.239
Current President's Budget	40.745	57.083	69.697	-	69.697
Total Adjustments	0.000	17.000	24.458	-	24.458
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	17.000			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	-	-	24.458	-	24.458

**Change Summary Explanation**

1) Increase of \$24.458 Million is due to increase in Future Tactical Unmanned Aircraft System (FTUAS).

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army										<b>Date:</b> May 2021		
<b>Appropriation/Budget Activity</b> 2040 / 4					<b>R-1 Program Element (Number/Name)</b> PE 0604113A / <i>Future Tactical Unmanned Aircraft System (FTUAS)</i>				<b>Project (Number/Name)</b> EX8 / <i>Future Unmanned Aircraft System (FUAS)</i>			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022 Base</b>	<b>FY 2022 OCO</b>	<b>FY 2022 Total</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>FY 2026</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
EX8: <i>Future Unmanned Aircraft System (FUAS)</i>	-	40.745	57.083	69.697	-	69.697	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

The Future Unmanned Aircraft System (FUAS) is a critical system in the Multi-Domain Operations (MDO) concept that will employ MDO capabilities at all echelons and allow ground based forces to project power from land into other domains to defeat highly capable enemies, secure terrain, and consolidate gains. FUAS encompasses an array of capabilities from platoon soldiers to Division Commanders. The Army Requirements Oversight Council (AROC) approved the FUAS Initial Capabilities Document (ICD) on 6 Mar 2019. The FUAS ICD includes requirements for Future Tactical UAS (FTUAS), Air Launched Effects (ALE), and Scalable Control Interface (SCI). Manned, optionally-manned, and unmanned systems will penetrate defense-in-depth environments by employing ALE with teaming and swarming effects to detect, decoy, jam radar and communications, conduct cyber-attack, spoof and jam Global Positioning System (GPS), and kinetic engagement.

The Future Vertical Lift Cross Functional Team (FVL CFT) FUAS line of effort is comprised of multiple components including the FTUAS for the Brigade Combat Team (BCT), and ALE. The FTUAS seeks to replace the RQ-7Bv2 Shadow assets within the BCTs. Key attributes of the FTUAS BCT focus on Rapid Deployability, Expeditionary Maneuver, and Mobility for adaptive and agile operations. FTUAS will consist of an aircraft subsystem that will include the airframe, propulsion, avionics, communications, navigation, and software systems; aircraft-specific ground support equipment including power generation, transportation, or command and control equipment; aircraft software; and required engineering, logistics, programmatic support.

ALE extends tactical and operational reach, lethality, and protection to the advanced team as an attritable or optionally recoverable aerial capability that detects, identifies, locates, and reports threats; represents a credible decoy; disrupts threat communication, targeting and acquisition systems; and delivers lethal and non-lethal effects against those threats across Multi-Domain Operations.

Justification: Fiscal Year (FY) 2022 FTUAS Research Development Technology & Evaluation (RDT&E) Base funding of \$69.944 million will be utilized for the following:

- 1) \$36.444 million to support FTUAS component development,
- 2) \$12.000 million to initiate FTUAS competitive prototyping and integration efforts,
- 3) \$20.000 million to support ALE Systems Analysis,
- 4) \$1.500 million provides Systems Engineering and Program Management (SEPM) to support FTUAS.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
<b>Title:</b> Multi-Domain Task Force (MDTF) Demonstration	18.079	-	-
<b>Description:</b> Funding for United States Army Pacific (USARPAC) Multi-Domain Task Force (MDTF) Demonstration supports UAS aircraft, payload and Multi-Function Electronic Warfare (MFEW) demonstration, which informed FTUAS requirements.			

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army		<b>Date:</b> May 2021		
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604113A / <i>Future Tactical Unmanned Aircraft System (FTUAS)</i>	<b>Project (Number/Name)</b> EX8 / <i>Future Unmanned Aircraft System (FUAS)</i>		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
<p><b>Title:</b> Air Launched Effects (ALE) Systems Analysis</p> <p><b>Description:</b> ALE systems analysis and Tech Maturation in preparation for a Materiel Development Decision (MDD), and to inform requirements. The PM will conduct market research, systems engineering analyses and an assessment of how the proposed candidate materiel solution approaches are technically feasible and have the potential to effectively address capability gaps, desired operational attributes, and associated external dependencies.</p> <p><b>FY 2021 Plans:</b> Continue to fund ALE Increment 1a demonstrations, engineering analysis, integration, prototyping, assessment of proposed material solution approaches in support of host platform integration. Continue to support the development of the Modular Open Systems Architecture and SCI required for ALE.</p> <p><b>FY 2022 Plans:</b> Continue to fund the ALE Prototype (Increment 1A) demonstrations, engineering analysis, prototyping and begin integration of proposed material solution approaches in support of host platform. Continue to support the development of the Modular Open Systems Architecture and SCI required for ALE.</p>		20.000	20.000	20.000
<p><b>Title:</b> System Engineering/Program Management</p> <p><b>Description:</b> SEPM</p> <p><b>FY 2021 Plans:</b> Funding to continue SEPM to support FUAS milestone decision requirements.</p> <p><b>FY 2022 Plans:</b> Funding to continue SEPM to support FUAS milestone decision requirements and program execution.</p> <p><b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> Conclusion of demonstration, reducing SEPM needs in following year.</p>		2.666	3.325	1.500
<p><b>Title:</b> Future Tactical Unmanned Aircraft System (FTUAS)</p> <p><b>Description:</b> The FTUAS will be a runway independent Group 3 unmanned aircraft that provides the Brigade Combat Teams with expeditionary, intelligence, surveillance, and reconnaissance (ISR) with improved target location and designation.</p> <p><b>FY 2021 Plans:</b></p>		-	33.758	48.197

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604113A / <i>Future Tactical Unmanned Aircraft System (FTUAS)</i>	<b>Project (Number/Name)</b> EX8 / <i>Future Unmanned Aircraft System (FUAS)</i>

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
Funds will development / integration of required FTUAS components (Miniaturized Type 1 Encryption, Miniaturized Mode 5/S IFF, Scalable Control Interface (SCI), and Tactical Data Link).			
<b><i>FY 2022 Plans:</i></b> Funds the award of competitive prototypes and continues to fund the development / integration of required FTUAS components (Artificial Intelligence, Miniaturized Mode 5/S IFF, Scalable Control Interface (SCI), Communications Relay Payloads).			
<b><i>FY 2021 to FY 2022 Increase/Decrease Statement:</i></b> FY21 Congressional Add: Program increase - \$2.0M for unmanned aerial vehicle fuel systems enhancements Program increase - \$15.0M for next generation secure waveform Program Increase total - \$17.0M			
FY22 will see an increase in competitive prototype development efforts as well as continuation of component development / Integration efforts.			
<b>Accomplishments/Planned Programs Subtotals</b>	40.745	57.083	69.697

<b>C. Other Program Funding Summary (\$ in Millions)</b>											
<u>Line Item</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022</u> <u>Base</u>	<u>FY 2022</u> <u>OCO</u>	<u>FY 2022</u> <u>Total</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>FY 2026</u>	<u>Cost To Complete</u>	<u>Total Cost</u>
• A00510: <i>Future UAS Family</i>	12.100	1.100	-	-	-	-	-	-	-	-	-

**Remarks**  
There is no Base Procurement funding in FY22.

**D. Acquisition Strategy**  
The Aviation Platform - Requirements Development Division (AP-RDD) prepared an Initial Capabilities Document (ICD) that was approved by the AROC on 6 Mar 2019.

The FVL CFT oversaw a demonstration effort in FY 2019 - 2021 that informed the FTUAS requirement to develop capability that will ultimately replace the RQ-7Bv2 Shadow TUAS within the BCT formation. The 12-month demonstration included 20 Soldier touchpoints (new equipment training, field training exercises, and Combat Training Center rotations) across five BCTs and included the training of 61 operators and 56 maintainers. The demonstration resulted in over 1,500 flight hours across more than 500 separate flights to inform the FTUAS Abbreviated Capability Development Document (A-CDD) that goes to an AROC in 3QFY2021. As part of the program development, the program will request Middle Tier Acquisition authority in 3QFY2022 to conduct Rapid Prototyping

AP-RDD - Prepared ALE Initial Capability Refinement Document (ICRD) that was approved by GEN John M. Murray, CG, AFC on 21 Oct 2019.

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604113A / <i>Future Tactical Unmanned Aircraft System (FTUAS)</i>	<b>Project (Number/Name)</b> EX8 / <i>Future Unmanned Aircraft System (FUAS)</i>

The plan to acquire ALE is through an incremental approach that allows rapid prototyping and fielding of technology to field available capabilities while continuing S&T efforts to mature and transition emerging technologies to fully realize required capabilities. This is accomplished through multiple prototype development activities for the air vehicle, payloads, and mission system architecture through, experiments, simulations, and demonstrations conducted in parallel and/or sequential timelines. The objective of this incremental effort is to develop and exhibit multiple ALE prototypes to enable a rapid transition from prototype to operational implementation in the force. Increment 1A will be a COTS/GOTS system to enable technology maturation, systems integration, and potential initial capabilities. ALE program of record will be purpose built utilizing parallel efforts informed by S&T investments and information learned from the demonstration and testing of Increment 1A. Additional increments will leverage the mission system architecture, payload technologies and interfaces from the initial increment and seek to extend the range of ALE for missions in support of LRPF.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army												Date: May 2021			
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)							
2040 / 4				PE 0604113A / Future Tactical Unmanned Aircraft System (FTUAS)				EX8 / Future Unmanned Aircraft System (FUAS)							
Management Services (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Systems Engineering and Program Management (SEPM)	Various	PM TUAS : Redstone Arsenal	1.593	2.666		3.325		1.500		-		1.500	Continuing	Continuing	-
<b>Subtotal</b>			1.593	2.666		3.325		1.500		-		1.500	Continuing	Continuing	N/A
Product Development (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Air Launched Effects (ALE) Systems Analysis	Various	PM TUAS : Redstone Arsenal	-	20.000		20.000		20.000		-		20.000	Continuing	Continuing	-
Future Tactical Unmanned Aircraft System (FTUAS)	Various	PM TUAS : Redstone Arsenal	-	-		33.758		48.197		-		48.197	Continuing	Continuing	-
<b>Subtotal</b>			-	20.000		53.758		68.197		-		68.197	Continuing	Continuing	N/A
Support (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Multi Domain Task Force (MDTF) UAS Demonstration	Various	Various : Various	10.800	18.079		-		-		-		-	10.000	38.879	-
<b>Subtotal</b>			10.800	18.079		-		-		-		-	10.000	38.879	N/A
<b>Project Cost Totals</b>			12.393	40.745		57.083		69.697		-		69.697	Continuing	Continuing	N/A
<b>Remarks</b>															

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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2022 Army</b>		<b>Date: May 2021</b>
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604113A / <i>Future Tactical Unmanned Aircraft System (FTUAS)</i>	<b>Project (Number/Name)</b> EX8 / <i>Future Unmanned Aircraft System (FUAS)</i>

Event Name	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
FTUAS Multi Domain Task Force Demonstration (MDTF)	[Blue Bar]																											
	FTUAS MDTF																											
FTUAS System Engineering/Program Management (SEPM)	[Blue Bar]																											
	FTUAS SEPM																											
FTUAS Demonstration (APA Funded)	[Blue Bar]																											
	FTUAS Demo																											
FTUAS A- CDD AROC					▲ 4																							
					FTUAS CDD AROC																							
FTUAS Middle Tier Acquisition (MTA) Decision FTUAS									▲ 6																			
									FTUAS MTA																			
FTUAS Competitive Prototyping									[Blue Bar]																			
									FTUAS CP																			
FTUAS Production Validation																	[Blue Bar]											
																	FTUAS PV											
FTUAS Operational Evaluation																	▲ 8											
																	FTUAS Op Eval											
FTUAS MTA Rapid Fielding Decision																					▲ 9							
																					FTUAS RFD							
FTUAS Full Rate Production																									[Blue Bar]			
																									FTUAS FRP			
ALE A-CDD AROC	▲ 1																											
	ALE AROC																											
ALE OTA 1					▲ 2																							
					ALE OTA																							
ALE Technical Assessment					[Blue Bar]																							
					ALE 1A																							



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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2022 Army</b>		<b>Date: May 2021</b>
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604113A / <i>Future Tactical Unmanned Aircraft System (FTUAS)</i>	<b>Project (Number/Name)</b> EX8 / <i>Future Unmanned Aircraft System (FUAS)</i>

Event Name	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026				
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	
ALE Multi-Vendor Demonstrations					ALE MIV Demo																								
ALE RFI 2									3 ▲ ALE RFI 2																				
ALE OTA 2													5 ▲ ALE OTA 2																
ALE System Integration													ALE SI																
ALE RFP																	7 ▲ ALE RFP												
ALE Milestone B																					10 ▲ ALE MS B								
ALE Engineering and Manufacturing Development																									ALE Eng and Mfr Dev				

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604113A / <i>Future Tactical Unmanned Aircraft System (FTUAS)</i>	<b>Project (Number/Name)</b> EX8 / <i>Future Unmanned Aircraft System (FUAS)</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
FTUAS Multi Domain Task Force Demonstration (MDTF)	1	2019	4	2020
FTUAS System Engineering/Program Management (SEPM)	1	2019	4	2025
FTUAS Demonstration (APA Funded)	3	2020	2	2021
FTUAS A- CDD AROC	3	2021	3	2021
FTUAS Middle Tier Acquisition (MTA) Decision FTUAS	4	2022	4	2022
FTUAS Competitive Prototyping	4	2022	4	2024
FTUAS Production Validation	4	2024	4	2025
FTUAS Operational Evaluation	2	2025	2	2025
FTUAS MTA Rapid Fielding Decision	3	2025	3	2025
FTUAS Full Rate Production	4	2025	4	2032
ALE RFI	2	2019	2	2019
ALE A-CDD AROC	3	2020	3	2020
ALE OTA 1	4	2020	4	2020
ALE Technical Assessment	4	2020	4	2022
ALE Multi-Vendor Demonstrations	4	2020	4	2021
ALE RFI 2	2	2021	2	2021
ALE OTA 2	3	2022	3	2022
ALE System Integration	3	2022	2	2024
ALE RFP	4	2023	4	2023
ALE Milestone B	3	2025	3	2025
ALE Engineering and Manufacturing Development	3	2025	3	2028

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2022 Army **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040: <i>Research, Development, Test &amp; Evaluation, Army / BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0604114A / <i>Lower Tier Air Missile Defense (LTAMD) Sensor</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	-	364.154	308.805	327.690	-	327.690	-	-	-	-	-	-
EX2: <i>Lower Tier Air Missile Defense (LTAMD) Capability</i>	-	364.154	308.805	327.690	-	327.690	-	-	-	-	-	-

**Note**

LTAMDS program will develop nascent capability and support Army demonstration and test initiatives to increase integrated offensive and defensive capability across warfighter functions and multiple domains.

**A. Mission Description and Budget Item Justification**

Lower Tier Air Missile Defense Sensor (LTAMDS) program will provide the required sensing capabilities, surveillance and fire control in the lower tier portion of the Army Integrated Air and Missile Defense (IAMD) of the ballistic missile defense battlespace. The acquisition program competitively selected the LTAMDS prime vendor in 1st Quarter (Q) Fiscal Year (FY) 2020 to build six Prototype sensors under the authority of Section 804 Rapid Prototyping. The sensor/radar set (RS) replaces the baseline PATRIOT RS (AN/MPQ-65A) in an IBCS enabled PATRIOT Battalion mitigating the risk associated with threat changes while also addressing growing obsolescence and increasing Operational & Support (O&S) cost. The LTAMDS capability addresses critical capability gaps, modernizes technology, and increases reliability and maintainability. The LTAMDS capability increases sensor/radar performance to maximize the inherent PATRIOT Advanced Capability (PAC-3) Missile Segment Enhanced (MSE) Interceptor capabilities to engage threats.

FY2022 UMR tasks include prototype manufacturing, acquiring targets for testing, conducting Developmental and Qualification testing, and conducting an Operational Demonstration. Pre-Planned Product Improvements (P3I) tasks include acquiring long lead hardware, targets for testing, and additional capability development. Other FY2022 tasks include long term power solution development and integration activities with the Integrated Air and Missile Defense Battle Command System (IBCS) and PATRIOT family of interceptors (PAC-2 GEM-T, PAC-3, PAC-3 MSE).

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2022 Army	<b>Date:</b> May 2021
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<b>Appropriation/Budget Activity</b> 2040: <i>Research, Development, Test &amp; Evaluation, Army / BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0604114A / <i>Lower Tier Air Missile Defense (LTAMD) Sensor</i>
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<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022 Base</b>	<b>FY 2022 OCO</b>	<b>FY 2022 Total</b>
Previous President's Budget	379.772	376.373	332.007	-	332.007
Current President's Budget	364.154	308.805	327.690	-	327.690
Total Adjustments	-15.618	-67.568	-4.317	-	-4.317
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-53.830			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-15.618	-13.738			
• Adjustments to Budget Years	-	-	-4.317	-	-4.317

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army										<b>Date:</b> May 2021		
<b>Appropriation/Budget Activity</b> 2040 / 4					<b>R-1 Program Element (Number/Name)</b> PE 0604114A / Lower Tier Air Missile Defense (LTAMD) Sensor				<b>Project (Number/Name)</b> EX2 / Lower Tier Air Missile Defense (LTAMD) Capability			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022 Base</b>	<b>FY 2022 OCO</b>	<b>FY 2022 Total</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>FY 2026</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
EX2: Lower Tier Air Missile Defense (LTAMD) Capability	-	364.154	308.805	327.690	-	327.690	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

The Lower Tier Air and Missile Defense Sensor (LTAMDS) satisfies the Warfighter's capability requirements in the Integrated Air and Missile Defense domain. The program provides the required sensing capabilities in the lower tier portion of the air and missile defense battlespace and expands the battlespace for the PATRIOT Advanced Capability (PAC-3) Missile Segment Enhancement (MSE) interceptor, and will be upgradable for the Future Interceptor. The Army Requirements Oversight Council (AROC) approved LTAMDS requirements in April 2016. The Army competitively selected the LTAMDS, which will counter air and missile defense threats using state-of-the-art technology, while reducing operating and sustainment costs, mitigating obsolescence, and increasing reliability and maintainability.

LTAMDS Fiscal Year (FY) 2022 funding will be utilized for UMR prototype manufacturing, acquiring targets for UMR testing, conducting Developmental and Qualification testing, and conducting an Operational Demonstration. FY2022 funding will be utilized to procure P3I long lead hardware, targets for testing, and capability development. FY2022 funding will also be utilized for long term power solution development and integration activities with the Integrated Air and Missile Defense Battle Command System (IBCS) and PATRIOT family of interceptors (PAC-2 GEM-T, PAC-3, PAC-3 MSE). FY 2022 activities support the FY 2018 National Defense Authorization Act (NDAA) requirement to accelerate LTAMDS Initial Operational Capability to no later than December 2023.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
<b>Title:</b> Lower Tier Missile Defense Sensor	364.154	308.805	327.690
<b>Description:</b> Provides the required sensing capabilities in the lower tier portion of the air and missile defense battlespace and expands the battlespace for the PAC-3 MSE interceptor.			
<b>FY 2021 Plans:</b>			
-Continue procurement of prototypes			
-Acquisition of targets			
-Integration of LTAMDS with IAMD Battle Command System (IBCS), PAC-2 GEM-T, and PAC-3 Family of Missiles			
-Develop and integrate additional capabilities through P3I efforts			
-Initiation of Contractor Verification Testing			
-Initiation of Long Term Power Development			
<b>FY 2022 Plans:</b>			
- Completion of LTAMDS Urgent Material Release (UMR) Prototypes			
- Completion of Developmental Test and Evaluation			

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army	<b>Date:</b> May 2021
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<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604114A / Lower Tier Air Missile Defense (LTAMD) Sensor	<b>Project (Number/Name)</b> EX2 / Lower Tier Air Missile Defense (LTAMD) Capability
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<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	FY 2020	FY 2021	FY 2022
<ul style="list-style-type: none"> <li>- Completion of Qualification testing</li> <li>- Conduct Operational Demonstration</li> <li>- Initiate development of P3I sensors</li> <li>- Acquire targets and interceptors for P3I testing</li> <li>- Continue integration with IAMD Battle Command System (IBCS)</li> <li>- Continue integration with PATRIOT family of interceptors (PAC-2 GEM-T, PAC-3, PAC-3 MSE)</li> </ul> <p><b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> The increase in funding from FY2021 to FY2022 of \$20.123M represents the initial Long Term Power Development funding and increased test range and test support activities.</p>			
<b>Accomplishments/Planned Programs Subtotals</b>	364.154	308.805	327.690

<b>C. Other Program Funding Summary (\$ in Millions)</b>											
Line Item	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
• C12101: Lower Tier Air and Missile Defense Sensor	-	-	35.473	-	35.473	-	-	-	-	-	-

**Remarks**

**D. Acquisition Strategy**

To enhance the Warfighter's lethality, survivability, and combat effectiveness, the Army used full and open competitive processes within Other Transactions Authority (OTA) agreements for rapid prototyping, qualification, and initial fielding efforts to meet the intent of FY 2018 NDAA Congressional language. Middle Tier Acquisition approach (Section 804, FY 2016 NDAA) authorities were leveraged in conjunction with the OTA to facilitate and accelerate traditional defense contractor involvement, cost sharing arrangements, and accelerates schedules. A FEDBIZOPS announcement and subsequent LTAMDS Industry Day generated government-contractor dialogue, provided contractor cost and schedule estimates, verified industry technology and manufacturing readiness, and informed stakeholders on design approaches and potential materiel solutions. This approach also provides senior leader decision points along the way to make informed decisions based on industry ability to meet threshold requirements. The Sense-Off conducted in 3rd Quarter (Q) FY 2019 along with industry proposals enabled the selection of an LTAMDS single vendor with the subsequent award of the OTA Agreement in 1Q FY 2020. The Urgent Materiel Release (UMR) LTAMDS program employs a 2-phased test approach. Phase 1 includes initial LTAMDS capabilities with PAC-3 MSE engagements in the primary radar sector along with 360O surveillance and PAC-2 GEM-T engagements in secondary sector. Phase 2 includes full LTAMDS UMR capability including 360 PAC-3 MSE and PAC-2 GEM-T engagements. UMR Phase 1 culminates with an Operational Demonstration of the military utility of the LTAMDS prototype in FY2022. Upon successful prototype demonstration, additional sensors will be procured to field up to four high-priority battalions. Concurrent to the LTAMDS UMR Rapid Prototyping efforts, Pre-Planned Product Improvement (P3I) efforts will develop solutions to bridge known capability gaps in the UMR prototypes. P3I efforts will develop a materiel solution that meets Full Materiel Release criteria and leading to Full Rate Production.

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army** **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604114A / Lower Tier Air Missile Defense (LTAMD) Sensor	<b>Project (Number/Name)</b> EX2 / Lower Tier Air Missile Defense (LTAMD) Capability
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<b>Management Services (\$ in Millions)</b>				<b>FY 2020</b>		<b>FY 2021</b>		<b>FY 2022 Base</b>		<b>FY 2022 OCO</b>		<b>FY 2022 Total</b>			<b>Target Value of Contract</b>
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	
Government Program Management	MIPR	Various : Redstone Arsenal, AL	14.315	2.350	Oct 2019	4.100	Oct 2020	4.250	Oct 2021	-		4.250	Continuing	Continuing	-
Systems Engineering and Technical Assistance (SETA)	Various	Systems Engineering and Technical Assistance : Huntsville, AL	13.000	3.509	Oct 2019	6.000	Oct 2020	7.500	Oct 2021	-		7.500	Continuing	Continuing	-
<b>Subtotal</b>			27.315	5.859		10.100		11.750		-		11.750	Continuing	Continuing	N/A

<b>Product Development (\$ in Millions)</b>				<b>FY 2020</b>		<b>FY 2021</b>		<b>FY 2022 Base</b>		<b>FY 2022 OCO</b>		<b>FY 2022 Total</b>			<b>Target Value of Contract</b>
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	
Concept Definition	C/CPFF	Raytheon, Lockheed Martin, Technovative Applications, Northrop Grumman : Andover MA; Liverpool NY; Brea CA; Linthicum MD	74.817	-		-		-		-		-	0.000	74.817	-
Product Development Support	C/Various	University Affiliated Research Center (UARC); MIT; The Federally Funded Research and Development Center (FFRDC) : Various	3.000	6.349	Dec 2019	7.500	Oct 2020	12.500	Oct 2021	-		12.500	Continuing	Continuing	-
OGA Development and Integration Activities	C/Various	Various : Various	-	-		-		39.140	Dec 2021	-		39.140	Continuing	Continuing	-
Rapid Prototyping	C/FFP	Raytheon : Various	51.366	293.703	Jan 2020	211.106	Feb 2021	114.324	Feb 2022	-		114.324	Continuing	Continuing	-
Pre-Planned Product Improvements (Raytheon)	SS/TBD	Raytheon : Various	-	-		-		59.556	Jan 2022	-		59.556	Continuing	Continuing	-
Development Engineering/ Contractor SEPM & Test	Various	CCDC WDI; Various : Picatinny Arsenal; Various	-	-		63.499		-		-		-	Continuing	Continuing	-

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army** **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604114A / Lower Tier Air Missile Defense (LTAMD) Sensor	<b>Project (Number/Name)</b> EX2 / Lower Tier Air Missile Defense (LTAMD) Capability
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<b>Product Development (\$ in Millions)</b>				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
<b>Subtotal</b>			129.183	300.052		282.105		225.520		-		225.520	Continuing	Continuing	N/A

<b>Support (\$ in Millions)</b>				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Product Development	C/Various	Army Laboratories, S3I System Integration Laboratory, CCDC : Various	-	2.454	Dec 2019	-		8.920	Dec 2021	-		8.920	Continuing	Continuing	-
<b>Subtotal</b>			-	2.454		-		8.920		-		8.920	Continuing	Continuing	N/A

<b>Test and Evaluation (\$ in Millions)</b>				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Test Planning/Targets/Interceptors/U.S. Other Government Agencies (OGAs)	MIPR	RDEC, SED, WSMR-T&E Support : Huntsville, AL; White Sands, NM	19.695	55.789	Jan 2020	16.600	Feb 2021	81.500	Feb 2022	-		81.500	Continuing	Continuing	-
<b>Subtotal</b>			19.695	55.789		16.600		81.500		-		81.500	Continuing	Continuing	N/A

			Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
<b>Project Cost Totals</b>			176.193	364.154	308.805	327.690	-	327.690	Continuing	Continuing	N/A

**Remarks**



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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2022 Army</b>		<b>Date: May 2021</b>
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604114A / Lower Tier Air Missile Defense (LTAMD) Sensor	<b>Project (Number/Name)</b> EX2 / Lower Tier Air Missile Defense (LTAMD) Capability

Event Name	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Select Single Vendor	1																											
Production Representative Unit Manufacturing																												
Qualification Testing																												
Developmental Test & Evaluation (Phase 1)																												
Operational Demonstration Test Event																												
Initial Operational Capability (Urgent Materiel Release)																												
Developmental Test & Evaluation (Phase 2)																												
Early User Test (EUT)																												
P3I Dev Testing/Operational Testing/Initial Operational T&E (DT/OT/IOTE)																												

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<b>Exhibit R-4A, RDT&amp;E Schedule Details: PB 2022 Army</b>		<b>Date: May 2021</b>
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604114A / Lower Tier Air Missile Defense (LTAMD) Sensor	<b>Project (Number/Name)</b> EX2 / Lower Tier Air Missile Defense (LTAMD) Capability

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Concept Definition	4	2017	4	2019
Select Single Vendor	1	2020	1	2020
Production Representative Unit Manufacturing	1	2020	4	2022
Qualification Testing	1	2022	4	2022
Developmental Test & Evaluation (Phase 1)	1	2022	3	2022
Operational Demonstration Test Event	3	2022	4	2022
Initial Operational Capability (Urgent Materiel Release)	4	2022	4	2022
Developmental Test & Evaluation (Phase 2)	1	2023	3	2023
Early User Test (EUT)	3	2023	3	2023
P3I Dev Testing/Operational Testing/Initial Operational T&E (DT/OT/IOTE)	2	2024	4	2026

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**Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Army** **Date: May 2021**

<b>Appropriation/Budget Activity</b> 2040: Research, Development, Test & Evaluation, Army / BA 4: Advanced Component Development & Prototypes (ACD&P)	<b>R-1 Program Element (Number/Name)</b> PE 0604115A / Technology Maturation Initiatives
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	-	171.058	141.109	270.124	-	270.124	-	-	-	-	-	-
<i>AX3: Technology Maturation Initiatives</i>	-	-	13.475	149.672	-	149.672	-	-	-	-	-	-
<i>AX4: Computational Prototyping Environment (CPE)</i>	-	3.927	5.224	-	-	-	-	-	-	-	-	-
<i>AX5: Next Generation Close Combat Missile</i>	-	5.630	4.813	3.000	-	3.000	-	-	-	-	-	-
<i>AX6: Active Protection Systems Integration</i>	-	7.096	10.107	-	-	-	-	-	-	-	-	-
<i>AX7: Multi-Mission High Energy Laser (MMHEL) Sys Demo</i>	-	17.882	7.844	-	-	-	-	-	-	-	-	-
<i>AX8: Adv Leth and Accuracy Sys for Med Calber (ALAS-MC)</i>	-	24.731	-	24.700	-	24.700	-	-	-	-	-	-
<i>AX9: Adv Mobility Experimental Prototype Adv Tech</i>	-	10.068	15.209	12.500	-	12.500	-	-	-	-	-	-
<i>AY1: MUM-T Platform Enabler</i>	-	6.904	4.332	-	-	-	-	-	-	-	-	-
<i>AY2: Army Operational Fires</i>	-	18.122	17.336	37.832	-	37.832	-	-	-	-	-	-
<i>AY3: Strategic Long Range Cannon</i>	-	76.698	62.769	-	-	-	-	-	-	-	-	-
<i>CE4: Emerging Technology Initiatives Development</i>	-	-	-	42.420	-	42.420	-	-	-	-	-	-

**A. Mission Description and Budget Item Justification**

This Project funds the Technology Maturation Initiative (TMI), which matures and integrates component technologies into early system/sub-system experimental prototypes for demonstration in relevant environments and tactical/operational scenarios. The Technology Maturation Initiative conducts experimental prototyping and integration of technologies from a demonstrated Technology Readiness (TRL) 6 to (TRL) 7, reducing the risk of technology insertion for current or future acquisition programs. TMI efforts support insertion of mature technologies to address emerging and enduring Army capability gaps in support of Army Modernization. Technologies matured include items such as advanced sensors/seekers; communications, command and control systems; directed energy systems; hypersonics; propulsion systems; guidance and control systems; active protection systems; armor; and advanced engines. TMI provides prototyping for Supersystem/Subsystem Intersection, Technology

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2022 Army	<b>Date:</b> May 2021
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<b>Appropriation/Budget Activity</b> 2040: <i>Research, Development, Test &amp; Evaluation, Army / BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0604115A / <i>Technology Maturation Initiatives</i>
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Product Prototyping, and Emerging Technology Opportunities. It provides the Army an improved mechanism for incorporating innovative technologies and advanced capabilities into acquisition program planning, and more closely aligns high-priority technology products with current and future Programs of Record.

The cited work is consistent with the Under Secretary of Defense, Research and Engineering priority focus areas and the Army Modernization Strategy.

Work in this PE is performed by Assistant Secretary of the Army for Acquisition, Logistics and Technology and the Army Research, Development, Test and Evaluation (RDT&E) Enterprise.

<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022 Base</b>	<b>FY 2022 OCO</b>	<b>FY 2022 Total</b>
Previous President's Budget	179.676	156.834	268.981	-	268.981
Current President's Budget	171.058	141.109	270.124	-	270.124
Total Adjustments	-8.618	-15.725	1.143	-	1.143
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-10.000			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-1.350	-			
• SBIR/STTR Transfer	-7.268	-5.725			
• Adjustments to Budget Years	-	-	1.143	-	1.143

**Change Summary Explanation**

Fiscal Year (FY) 2021 decrease of \$10.000 million due to Congressional reduction to 0604115A / AY2 for operational fires requirement.

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army										<b>Date:</b> May 2021		
<b>Appropriation/Budget Activity</b> 2040 / 4					<b>R-1 Program Element (Number/Name)</b> PE 0604115A / <i>Technology Maturation Initiatives</i>				<b>Project (Number/Name)</b> AX3 / <i>Technology Maturation Initiatives</i>			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022 Base</b>	<b>FY 2022 OCO</b>	<b>FY 2022 Total</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>FY 2026</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
<i>AX3: Technology Maturation Initiatives</i>	-	-	13.475	149.672	-	149.672	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

This Project funds the Technology Maturation Initiative (TMI), which matures and integrates component technologies into early system and sub-system experimental prototypes for demonstration in relevant environments and tactical/operational scenarios. The Technology Maturation Initiative takes emerging Science and Technology (S&T) Technology Readiness Level (TRL) 6 products to a goal of TRL 7, integrating them into technology demonstrators and experimental prototypes that inform requirements and reduce the risk of technology insertion for future acquisition programs. This Initiative streamlines the development and insertion of mature technologies that support advanced ground systems; aviation systems; command, control, communication & reconnaissance systems and equipment; precision weapons; High Energy Laser (HEL) systems; and Soldier equipment. It provides the Army an improved mechanism for incorporating innovative technologies and advanced capabilities in the early stages of acquisition program planning, and more closely aligns high-priority S&T products and future Programs of Record.

Army senior leadership approves Technology Maturation Initiative projects prior to budget year programming based on priority and opportunity, ensuring that demonstrations have a high potential for filling capability gaps and transitioning. Approved Technology Maturation Initiative projects are typically 2-4 years in duration and are budgeted under Projects AX3, AX5, AX8, AX9, AY2, and CE4.

This project also provides a tiered evaluation and feasibility application of innovation and disruptive technologies to Army capability gaps at any stage in a technology's lifecycle. The project will partner with academia, small, non-traditional companies, and the defense industrial base to incubate ideas, stage pilot evaluations and to ensure more rapid integration and prototyping of the best, most innovative solutions into Army systems.

The cited work is consistent with the Under Secretary of Defense, Research and Engineering priority focus areas and the Army Modernization Strategy.

Work in this Project is performed by Assistant Secretary of the Army for Acquisition, Logistics and Technology and the Army Research, Development, Test and Evaluation (RDT&E) Enterprise.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
<b>Title:</b> Future Vertical Lift (FVL) Helmet Mounted Display	-	3.798	-
<b>Description:</b> This task integrates and demonstrates a TRL 7 rotorcraft Helmet Mounted Display (HMD) compatible with current 56P helmets and FVL distributed aperture systems (DASs). This enables heads up, eyes out pilotage and improve situational awareness (SA) and maneuver for FVL pilots in all conditions. The HMD has a head tracker system that is self-contained and self-calibrating.			

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604115A / <i>Technology Maturation Initiatives</i>	<b>Project (Number/Name)</b> AX3 / <i>Technology Maturation Initiatives</i>

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
<p><b>FY 2021 Plans:</b> Mature and integrate novel HMDs with high bright full color high resolution organic light-emitting diodes (OLEDs), low cost free-form prism optics, and low cost micro complementary metal?oxide?semiconductor (CMOS) cameras optimized for utilization by Army aviators in all pilotage conditions; and mature inertial measurement unit (IMU) technologies for integration with head tracking hardware/software.</p> <p><b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> FVL Helmet Mounted Display (HMD) effort transitions to the Integrated Vision Augmented System (IVAS) for Air and Ground Vehicle Platforms effort (PE 0604115A / AX3) in FY 2022.</p>			
<p><b>Title:</b> Large Caliber Armament System Prototype</p> <p><b>Description:</b> This task completes fabrication of turret and ammunition handling systems; integrates the weapon system components including the gun, turret, ammunition handling system, fire control and targeting sensor; and characterize munitions to establish expected performance.</p> <p><b>FY 2021 Plans:</b> Mature and integrate 120mm reduced-recoil armament system in a test bed configuration to inform Next Generation Combat Vehicle requirements; fabricate turret and ammunition and handling systems for integration.</p> <p><b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> Effort ends in FY2021.</p>	-	9.677	-
<p><b>Title:</b> Integrated Vision Augmented System (IVAS) for Air and Ground Vehicle Platforms</p> <p><b>Description:</b> This project leverages the technologies developed under the IVAS program (Integrated Vision Augmented System) and applies them for use on Air and Ground vehicle platforms. Air: This architecture will enable better situational awareness for the air crew (pilots and rear crew) and passenger warfighters in the air platform with augmented reality data system for displaying 360 degree sensors, pilotage and targeting sensors, blue/red force tracking data, communications, mission data, and vehicle flight data. Ground Vehicle: This architecture will enable better situational awareness for the crew (commander, gunner, driver, and vehicle crew) and passenger warfighters in the ground platform with augmented reality data system for displaying 360 degree sensors, driver, commander, and targeting sensors, blue/red force tracking data, communications, mission data, and vehicle data. The system will interface to ATLAS (ground system) and other architecture systems.</p> <p><b>FY 2022 Plans:</b></p>	-	-	42.070

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army		<b>Date:</b> May 2021		
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604115A / <i>Technology Maturation Initiatives</i>	<b>Project (Number/Name)</b> AX3 / <i>Technology Maturation Initiatives</i>		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
<p>Will complete definitions of the IVAS technologies and architecture for use on Air and Ground Platforms. Will fabricate mid program prototyping of Air and Ground A/R prototyping to for Warfighter touch points on the technologies and design to increase capability and reduce risk in the FY23 prototypes.</p> <p><b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> Future Vertical Lift (FVL) Helmet Mounted Display effort (PE 0604115A / AX3) transitions to the Integrated Vision Augmented System (IVAS) for Air and Ground Vehicle Platforms effort in FY 2022.</p>				
<p><b>Title:</b> TMI Planning for Super-System and Technology Product Prototyping</p> <p><b>Description:</b> TMI Super-System and Technology Product Prototyping addresses the Army advanced technologies that support multiple Programs of Record (PoRs) within a PEO or multiple PEOs and/or technologies that have matured to TRL 6 from S&amp;T but are deemed too high risk for transition to PoRs without additional prototyping / Soldier evaluations. Efforts selected by the 3-Star Technology Maturation Board will address PoRs required capability gaps in the areas of deep strike munition/ munition systems, alternative munition effect capability, advanced navigation / networking, and advanced Soldier, vehicle, and platform capabilities.</p> <p><b>FY 2022 Plans:</b> Will execute prototyping in support of Soldier evaluations in potential areas of deep strike munition/ munition systems, advanced navigation / networking capability, and/or advanced Soldier, vehicle, and platform capabilities.</p> <p><b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> New start effort in FY 2022. Funding was realigned from PE 0604115A / AY3 Strategic Long Range Cannon.</p>		-	-	72.602
<p><b>Title:</b> Universal MDO Fire Control and SA Systems</p> <p><b>Description:</b> This is a new Task required to support the Technology Maturation Initiative experimental prototypes to demonstrate high priority capability to provide mid to large caliber weapon platforms a real time 360 degree situation awareness (SA) and sensor input to the targeting / firing control systems. This Task will prototype a common architecture and interface kit containing IR/RF sensors to ensure interoperability and sustainment across platforms. This Task is needed in FY 2022 to enable a timely start of common architecture and interface definitions / 'B-Kit' like interface hardware development that supports multiple platforms and prototype demonstration of common 360 degree modular sensing system for fire control and SA with self-calibration / boresight functions across dynamic battlefield conditions. The cited work is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.</p> <p><b>FY 2022 Plans:</b></p>		-	-	35.000

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army		<b>Date:</b> May 2021		
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604115A / <i>Technology Maturation Initiatives</i>	<b>Project (Number/Name)</b> AX3 / <i>Technology Maturation Initiatives</i>		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
Will develop an initial architecture and interface specification that is compatible with installation and interface to multiple mid to larger caliber weapons platforms. Will prototype universal sensing modules and architecture functionality on a mid or large caliber weapon platform for evaluation in a dynamic battlefield environment.				
<b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> New Start effort in FY 2022 approved by the Technology Maturation Board.				
<b>Accomplishments/Planned Programs Subtotals</b>		-	13.475	149.672
<b>C. Other Program Funding Summary (\$ in Millions)</b>				
N/A				
<b>Remarks</b>				
<b>D. Acquisition Strategy</b>				
N/A				



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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army												Date: May 2021			
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)							
2040 / 4				PE 0604115A / Technology Maturation Initiatives				AX3 / Technology Maturation Initiatives							
Management Services (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
TMI Planning for Super-System and Technology Product Prototyping	Option/Various	Various : Various	-	-		-		72.602		-		72.602	0.000	72.602	-
<b>Subtotal</b>			-	-	-		72.602		-		72.602	0.000	72.602	N/A	
Product Development (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Integrated Vision Augmented System (IVAS) for Air and Ground Vehicle Platforms	C/Various	Various : Various	-	-		-		42.070		-		42.070	0.000	42.070	-
Universal MDO Fire Control and SA Systems	C/Various	Various : Various	-	-		-		35.000		-		35.000	0.000	35.000	-
<b>Subtotal</b>			-	-	-		77.070		-		77.070	0.000	77.070	N/A	
Support (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Future Vertical Lift Helmet Mounted Display (FVL HMD)	C/Various	AFC : Fort Belvoir, VA	-	-		3.798		-		-		-	13.000	16.798	-
Large Caliber Armament System Prototype	C/Various	AFC : Picatinny, NJ	-	-		9.677		-		-		-	18.400	28.077	-
<b>Subtotal</b>			-	-	13.475		-		-		-	31.400	44.875	N/A	
<b>Project Cost Totals</b>			-	-	13.475		149.672		-		149.672	31.400	194.547	N/A	

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<b>Exhibit R-3, RDT&amp;E Project Cost Analysis: PB 2022 Army</b>							<b>Date: May 2021</b>			
<b>Appropriation/Budget Activity</b> 2040 / 4			<b>R-1 Program Element (Number/Name)</b> PE 0604115A / <i>Technology Maturation Initiatives</i>			<b>Project (Number/Name)</b> AX3 / <i>Technology Maturation Initiatives</i>				
	<b>Prior Years</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022 Base</b>	<b>FY 2022 OCO</b>	<b>FY 2022 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>	

**Remarks**

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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2022 Army</b>			<b>Date: May 2021</b>		
<b>Appropriation/Budget Activity</b> 2040 / 4		<b>R-1 Program Element (Number/Name)</b> PE 0604115A / <i>Technology Maturation Initiatives</i>		<b>Project (Number/Name)</b> AX3 / <i>Technology Maturation Initiatives</i>	

Event Name	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Large Caliber Armament System Prototype					██████████																							
Fabricate Turret									██████████																			
Fabricate Ammunition Handling System									██████████																			
Characterize munitions																												
Integration of Weapon System Components																												
FVL Helmet Mounted Display									██████████																			
Display System Design									██████████																			
Head Tracker Design									██████████																			
Integrated Vision Augmented System (IVAS) for Air and Ground Vehicle Platforms													██████████				██████████											
AIR IVAS A/R Data Architecture													██████████															
AIR IVAS Mid-Point Prototype with Soldier Touch Point 1													▲															
Ground IVAS A/R Data Architecture									██████████																			
Ground IVAS Mid-Point Vehicle Prototype for crew with Soldier Touch Point 1													▲															

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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2022 Army</b>		<b>Date: May 2021</b>
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604115A / <i>Technology Maturation Initiatives</i>	<b>Project (Number/Name)</b> AX3 / <i>Technology Maturation Initiatives</i>

Event Name	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Fabricate wireless crew sensor/data share prototype for Soldier Touchpoint 1.									█	█	█	█																
Optimize GGIA Architecture for full 360 sensor and data bandwidth									█	█	█	█																
Wireless crew sensor/data share prototype - Soldier Touchpoint 1.													▲															
Fabricate full IVAS for Air system for vehicle													█	█	█	█												
Optimize IVAS Air Architecture post Soldier Touch Point#1													█	█	█	█												
Optimize IVAS Ground Architecture post Soldier Touch Point#1													█	█	█	█												
Fabricate full IVAS for Ground system for vehicle													█	█	█	█												
Demo/Evaluation: 4QFY23 Full prototype/Soldier Touch Point#2																	▲											
Universal MDO Fire Control and SA Systems									█	█	█	█	█	█	█	█												
TMI Planning for Super-System and Technology Product Prototyping									█	█	█	█	█	█	█	█												

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604115A / <i>Technology Maturation Initiatives</i>	<b>Project (Number/Name)</b> AX3 / <i>Technology Maturation Initiatives</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Large Caliber Armament System Prototype	1	2021	4	2021
Fabricate Turret	1	2021	4	2021
Fabricate Ammunition Handling System	1	2021	4	2021
Characterize munitions	4	2021	4	2021
Integration of Weapon System Components	4	2021	4	2021
FVL Helmet Mounted Display	1	2021	4	2021
Display System Design	1	2021	3	2021
Head Tracker Design	2	2021	4	2021
Integrated Vision Augmented System (IVAS) for Air and Ground Vehicle Platforms	1	2022	4	2023
AIR IVAS A/R Data Architecture	1	2022	4	2022
AIR IVAS Mid-Point Prototype with Soldier Touch Point 1	1	2023	1	2023
Ground IVAS A/R Data Architecture	1	2022	4	2022
Ground IVAS Mid-Point Vehicle Prototype for crew with Soldier Touch Point 1	1	2023	1	2023
Fabricate wireless crew sensor/data share prototype for Soldier Touchpoint 1.	1	2022	4	2022
Optimize GGIA Architecture for full 360 sensor and data bandwidth	1	2022	4	2022
Wireless crew sensor/data share prototype - Soldier Touchpoint 1.	1	2023	1	2023
Fabricate full IVAS for Air system for vehicle	1	2023	4	2023
Optimize IVAS Air Architecture post Soldier Touch Point#1	1	2023	4	2023
Optimize IVAS Ground Architecture post Soldier Touch Point#1	1	2023	4	2023
Fabricate full IVAS for Ground system for vehicle	1	2023	4	2023
Demo/Evaluation: 4QFY23 Full prototype/Soldier Touch Point#2	4	2023	4	2023
Universal MDO Fire Control and SA Systems	1	2022	4	2024

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**Exhibit R-4A, RDT&E Schedule Details: PB 2022 Army** **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604115A / <i>Technology Maturation Initiatives</i>	<b>Project (Number/Name)</b> AX3 / <i>Technology Maturation Initiatives</i>
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Events	Start		End	
	Quarter	Year	Quarter	Year
TMI Planning for Super-System and Technology Product Prototyping	1	2022	4	2023

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army										<b>Date:</b> May 2021		
<b>Appropriation/Budget Activity</b> 2040 / 4					<b>R-1 Program Element (Number/Name)</b> PE 0604115A / <i>Technology Maturation Initiatives</i>				<b>Project (Number/Name)</b> AX4 / <i>Computational Prototyping Environment (CPE)</i>			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022 Base</b>	<b>FY 2022 OCO</b>	<b>FY 2022 Total</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>FY 2026</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
<i>AX4: Computational Prototyping Environment (CPE)</i>	-	3.927	5.224	-	-	-	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

This Project funds the development and demonstration of a robust Virtual Proving Ground (VPG) for rapid, accurate, and computational prototyping of major Army platforms. Computation Prototyping Environment (CPE) provides the ability to validate platform design variations in a VPG, in a way that identifies potential performance and design failures, and assesses mitigating solutions and trades before cost bearing production and manufacturing. Activities under this Project include the maturation and integration of physics-based, computational modeling with new advances in tradespace analytics and visualization. This Project leverages recent Department of Defense (DOD) advancements in large data tradespace analytics, high fidelity physics-based modeling, high-performance computing capabilities, and inverse modeling approaches to enable rapid computational prototyping to inform emerging acquisition programs.

Work in this Project is fully coordinated with Program Element (PE) 0633465A (Future Vertical Lift Advanced Technology)

The cited work is consistent with the Under Secretary of Defense for Research and Engineering Science and Technology focus areas and the Army Modernization Strategy.

Work in this Project is performed by Army Research, Development, Test and Evaluation (RDT&E) Enterprise.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
<b>Title:</b> Computational Prototyping Environment (CPE)	3.927	5.224	-
<b>Description:</b> Computational Analysis Toolkit (CAT) matures and integrates physics-based, computational modeling with new advances in tradespace analytics and visualization to demonstrate a robust Virtual Proving Ground (VPG) that provides the ability to virtually explore design tradespaces and understand possible defeat strategies for prototype Army platforms. Demonstrates rapid computational prototyping to inform emerging acquisition programs through large data tradespace analytics, high fidelity physics-based modeling, high-performance computing capabilities, and inverse modeling approaches. CPE capabilities will be piloted to support and inform Army Future Vertical Lift (FVL) platform design.			
<b>FY 2021 Plans:</b> Develop a data repository for physical test data, computational models, and operational environments linked to High Performance Computing environment. Improve the FVL VPG to model candidate Future Attack Reconnaissance Aircraft (FARA) designs during			

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army		<b>Date:</b> May 2021		
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604115A / <i>Technology Maturation Initiatives</i>	<b>Project (Number/Name)</b> AX4 / <i>Computational Prototyping Environment (CPE)</i>		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
maneuver and the VPG to include different operationally relevant environmental conditions; improve machine learning techniques to drive engineering analysis of FVL systems.  <b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> Effort ends in FY 2021.				
<b>Accomplishments/Planned Programs Subtotals</b>		3.927	5.224	-
<b>C. Other Program Funding Summary (\$ in Millions)</b> N/A				
<b>Remarks</b>				
<b>D. Acquisition Strategy</b> N/A				



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<b>Exhibit R-3, RDT&amp;E Project Cost Analysis: PB 2022 Army</b>												<b>Date: May 2021</b>			
<b>Appropriation/Budget Activity</b> 2040 / 4						<b>R-1 Program Element (Number/Name)</b> PE 0604115A / <i>Technology Maturation Initiatives</i>						<b>Project (Number/Name)</b> AX4 / <i>Computational Prototyping Environment (CPE)</i>			
<b>Support (\$ in Millions)</b>				<b>FY 2020</b>		<b>FY 2021</b>		<b>FY 2022 Base</b>		<b>FY 2022 OCO</b>		<b>FY 2022 Total</b>			
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
Computational Prototyping Environment	C/TBD	ERDC : Vicksburg, MS	-	3.927		5.224		-		-		-	6.918	16.069	-
<b>Subtotal</b>			-	3.927		5.224		-		-		-	6.918	16.069	N/A
			<b>Prior Years</b>	<b>FY 2020</b>		<b>FY 2021</b>		<b>FY 2022 Base</b>		<b>FY 2022 OCO</b>		<b>FY 2022 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Project Cost Totals</b>			-	3.927		5.224		-		-		-	6.918	16.069	N/A
<b>Remarks</b>															

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**Exhibit R-4, RDT&E Schedule Profile: PB 2022 Army** **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604115A / <i>Technology Maturation Initiatives</i>	<b>Project (Number/Name)</b> AX4 / <i>Computational Prototyping Environment (CPE)</i>
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Event Name	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Computational Prototyping Environment																												

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604115A / <i>Technology Maturation Initiatives</i>	<b>Project (Number/Name)</b> AX4 / <i>Computational Prototyping Environment (CPE)</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Computational Prototyping Environment	3	2018	4	2021

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**Exhibit R-2A, RDT&E Project Justification:** PB 2022 Army **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4					<b>R-1 Program Element (Number/Name)</b> PE 0604115A / <i>Technology Maturation Initiatives</i>				<b>Project (Number/Name)</b> AX5 / <i>Next Generation Close Combat Missile</i>			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022 Base</b>	<b>FY 2022 OCO</b>	<b>FY 2022 Total</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>FY 2026</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
<i>AX5: Next Generation Close Combat Missile</i>	-	5.630	4.813	3.000	-	3.000	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

This Project demonstrates a prototype close combat missile with a multi-pulse, boost-sustain flight propulsion system providing extended range and decreased time of flight. Activities mature proof-of-principle hardware into an integrated tactical-representative design, and demonstrate a prototype missile with lethality overmatch of emerging threats. Early prototyping work concludes in Fiscal Year (FY) 2021 to mature technology and demonstrate needed Warfighter capability in advance of acquisition program of record.

Work in this PE complements PE 0603462A (Next Generation Combat Vehicle Advanced Technology).

The cited work is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Work in this Project is performed by Army Research, Development, Test and Evaluation (RDT&E) Enterprise.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
<b>Title:</b> Next Generation Close Combat Missile	5.630	4.813	3.000
<b>Description:</b> This effort demonstrates a prototype close combat missile with a multi-pulse, boost-sustain flight propulsion system providing extended range and decreased time of flight.			
<b>FY 2021 Plans:</b> Evaluate performance of propulsion system components, integrated in a tactically-representative missile, through flight demonstration; transition designs, documentation and data to Program Executive Office Missiles and Space.			
<b>FY 2022 Plans:</b> Will complete fabrication of prototype missile system using the advanced propulsion system components and conduct flight evaluation of the final missile prototype with participation with the transition partner - Program Executive Office Missiles and Space.			
<b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> Normal program progression to support test / evaluation.			
<b>Accomplishments/Planned Programs Subtotals</b>	5.630	4.813	3.000

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604115A / <i>Technology Maturation Initiatives</i>	Project (Number/Name) AX5 / <i>Next Generation Close Combat Missile</i>
<b>C. Other Program Funding Summary (\$ in Millions)</b> N/A		
<b>Remarks</b>		
<b>D. Acquisition Strategy</b> N/A		

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army												Date: May 2021			
Appropriation/Budget Activity 2040 / 4					R-1 Program Element (Number/Name) PE 0604115A / Technology Maturation Initiatives				Project (Number/Name) AX5 / Next Generation Close Combat Missile						
Support (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Next Generation Close Combat Missile	Various	AvMC : Huntsville, AL	-	5.630		4.813		3.000		-		3.000	0.000	13.443	-
<b>Subtotal</b>			-	5.630		4.813		3.000		-		3.000	0.000	13.443	N/A
<b>Project Cost Totals</b>			-	5.630		4.813		3.000		-		3.000	0.000	13.443	N/A
<b>Remarks</b>															

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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2022 Army</b>			<b>Date: May 2021</b>		
<b>Appropriation/Budget Activity</b> 2040 / 4		<b>R-1 Program Element (Number/Name)</b> PE 0604115A / <i>Technology Maturation Initiatives</i>		<b>Project (Number/Name)</b> AX5 / <i>Next Generation Close Combat Missile</i>	

Event Name	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Next Generation Close Combat Missile																												
Fabricate prototype missile																												
4QFY22 Test Firing / Flight Evaluation																												

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604115A / <i>Technology Maturation Initiatives</i>	<b>Project (Number/Name)</b> AX5 / <i>Next Generation Close Combat Missile</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Next Generation Close Combat Missile	1	2019	4	2022
Fabricate prototype missile	1	2022	4	2022
4QFY22 Test Firing / Flight Evaluation	4	2022	4	2022



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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army										<b>Date:</b> May 2021		
<b>Appropriation/Budget Activity</b> 2040 / 4					<b>R-1 Program Element (Number/Name)</b> PE 0604115A / <i>Technology Maturation Initiatives</i>				<b>Project (Number/Name)</b> AX6 / <i>Active Protection Systems Integration</i>			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022 Base</b>	<b>FY 2022 OCO</b>	<b>FY 2022 Total</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>FY 2026</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
<i>AX6: Active Protection Systems Integration</i>	-	7.096	10.107	-	-	-	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

This Project matures, integrates, and demonstrates protection and survivability technologies as part of active protection systems (APS) prototyping for the Army's combat vehicles. Activities integrate complimentary survivability technologies to enable layers of enhanced protection capability, providing greater survivability against current and emerging advanced threats. This Project demonstrates a suite of technologies on a fielded combat vehicle platform using an APS common architecture, and defines component interface standards and specifications that enable adaptive APS solutions. Activities support the Army's APS strategy to maintain or reduce vehicle weight by reducing reliance on armor with other means such as sensing, warning, hostile fire detection, and active countermeasures.

Work in this Project is coordinated with PE 0603462A (Next Generation Combat Vehicle Advanced Technology) and transitions to PE 0604852A (Suite of Vehicle Protection Systems - EMD).

Funding has been realigned to reflect the FY20 financial restructure and Army Modernization Priorities.

The cited work is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Work in this Project is performed by Army Research, Development, Test and Evaluation (RDT&E) Enterprise.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
<b>Title:</b> Agile Layered Protection: APS Integration Advanced Technology Demonstrator	7.096	10.107	-
<b>Description:</b> Activities integrate and demonstrate mature APS technologies layered through a common architecture on an Army ground combat vehicle platform, addressing technical and integration challenges for a system designed to address both current and emerging advanced threats. Selects and integrates mature component technologies that are best suited to optimize added capability for the Active Technology Demonstrator platform. Demonstrates a suite of APS technologies and effects that optimize performance levels for survivability and protection through advanced threat detection, multiple threat defeat systems, and improved situational awareness.			
<b>FY 2021 Plans:</b>			
Continue to mature the combat vehicle protection layering approach, integrating additional protection and survivability capabilities based on selection of mature technologies from FY 2020; optimize, design, and demonstrate integration of selected protection			

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604115A / <i>Technology Maturation Initiatives</i>	<b>Project (Number/Name)</b> AX6 / <i>Active Protection Systems Integration</i>

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
technologies on the combat vehicle platform demonstrator to validate integration; and test the combat vehicle platform demonstrator to ensure the added technologies do not degrade the vehicle?s or previously tested technologies? performance.  <b><i>FY 2021 to FY 2022 Increase/Decrease Statement:</i></b> Effort ends in FY 2021.			
<b>Accomplishments/Planned Programs Subtotals</b>	7.096	10.107	-

**C. Other Program Funding Summary (\$ in Millions)**  
N/A

**Remarks**

**D. Acquisition Strategy**  
N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army											Date: May 2021				
Appropriation/Budget Activity					R-1 Program Element (Number/Name)					Project (Number/Name)					
2040 / 4					PE 0604115A / <i>Technology Maturation Initiatives</i>					AX6 / <i>Active Protection Systems Integration</i>					
Support (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Engineer Integration of APS Layered Protection	C/Various	Various : Various	-	4.219		-		-		-		-	0.000	4.219	-
Validation of APS Layered Protection	Various	Various : Various	-	1.918		-		-		-		-	0.000	1.918	-
Integration of added APS Layered Protection	C/Various	Various : Various	-	0.959		4.808		-		-		-	0.000	5.767	-
Validation of added APS Layered Protection	C/Various	AFC : Warren, MI	-	-		5.299		-		-		-	0.000	5.299	-
<b>Subtotal</b>			-	7.096		10.107		-		-		-	0.000	17.203	N/A
			Prior Years	FY 2020	FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract	
<b>Project Cost Totals</b>			-	7.096		10.107		-		-		-	0.000	17.203	N/A
<b>Remarks</b>															

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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2022 Army</b>		<b>Date: May 2021</b>
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604115A / <i>Technology Maturation Initiatives</i>	<b>Project (Number/Name)</b> AX6 / <i>Active Protection Systems Integration</i>

Event Name	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Active Protection Systems Integration																												
Integration of APS Layered Protection Technologies																												
Validation of Integrated Layered Protection Technologies																												
Integration of Added APS Layered Protection Technologies																												
Validation of Added APS Layered Protection Technologies																												

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604115A / <i>Technology Maturation Initiatives</i>	<b>Project (Number/Name)</b> AX6 / <i>Active Protection Systems Integration</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Active Protection Systems Integration	1	2019	4	2021
Integration of APS Layered Protection Technologies	1	2019	3	2020
Validation of Integrated Layered Protection Technologies	3	2020	4	2020
Integration of Added APS Layered Protection Technologies	1	2021	3	2021
Validation of Added APS Layered Protection Technologies	3	2021	4	2021

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army										<b>Date:</b> May 2021		
<b>Appropriation/Budget Activity</b> 2040 / 4					<b>R-1 Program Element (Number/Name)</b> PE 0604115A / <i>Technology Maturation Initiatives</i>				<b>Project (Number/Name)</b> AX7 / <i>Multi-Mission High Energy Laser (MMHEL) Sys Demo</i>			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022 Base</b>	<b>FY 2022 OCO</b>	<b>FY 2022 Total</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>FY 2026</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
<i>AX7: Multi-Mission High Energy Laser (MMHEL) Sys Demo</i>	-	17.882	7.844	-	-	-	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

This Project matures and demonstrates an integrated a 50 kilowatt (kW)-class laser weapon system into a Stryker platform, providing a system-level, High Energy Laser (HEL) experimental prototype for demonstration in realistic operating environments. These demonstrations will inform requirements, decrease risk for future Army HEL acquisition programs, and support the future development of warfighter Tactics/Techniques/Procedures and Concept of Operations. HEL weapon systems are expected to complement conventional offensive and defensive weapons at a lower cost-per-shot than current systems and without the need to stockpile ordnance. A 50 kW-class laser weapon system has the potential to engage and defeat rockets, artillery, mortars (RAM); unmanned aerial vehicles (UAVs); sensors; and optics for maneuvering Brigade Combat Teams (BCTs). Demonstrations will also inform potential future capability to defeat both fixed- and rotary-wing manned aircraft. Leveraging Government investments and Industry technology advancements, will review and select existing HEL subsystem designs for integration into a Stryker combat vehicle; will conduct integration and demonstration of a system-level HEL experimental prototype; and will provide assessment of technical performance in an operational environment. This effort informs application of laser weapons to other combat platforms and rapid prototyping to units-of-action to meet emerging threats expressed in the National Defense Strategy.

The cited work is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Work in this Project is performed by the Rapid Capabilities and Critical Technologies Office (RCCTO).

**B. Accomplishments/Planned Programs (\$ in Millions)**

	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
<b>Title:</b> Multi-Mission High Energy Laser (MMHEL) Integration and Demonstration	17.882	7.844	-
<b>Description:</b> This effort matures, integrates, and demonstrates HEL technologies on Army Stryker vehicles to inform Maneuver-Short Range Air Defense (M-SHORAD) requirements and reduce risk for M-SHORAD. The goal is to protect maneuvering forces from RAM and Unmanned Aerial System (UAS) threats.			
<b>FY 2021 Plans:</b> Integrate system hardware, weapon fire control software, Forward Area Air Defense Command and Control (FAADC2), and Intelligence software; conduct full system level test/fix/test process; system verification and acceptance testing; and prepare for and execute a technology readiness level 7 demonstration. Execute system performance testing to inform Capability Developer?s requirement, Concept of Operations and training development.			
<b>FY 2021 to FY 2022 Increase/Decrease Statement:</b>			

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604115A / <i>Technology Maturation Initiatives</i>	<b>Project (Number/Name)</b> AX7 / <i>Multi-Mission High Energy Laser (MMHEL) Sys Demo</i>

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
Effort ends in FY 2021.			
<b>Accomplishments/Planned Programs Subtotals</b>	17.882	7.844	-

**C. Other Program Funding Summary (\$ in Millions)**

N/A

**Remarks**

**D. Acquisition Strategy**

N/A

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<b>Exhibit R-3, RDT&amp;E Project Cost Analysis: PB 2022 Army</b>												<b>Date: May 2021</b>				
<b>Appropriation/Budget Activity</b> 2040 / 4						<b>R-1 Program Element (Number/Name)</b> PE 0604115A / <i>Technology Maturation Initiatives</i>				<b>Project (Number/Name)</b> AX7 / <i>Multi-Mission High Energy Laser (MMHEL) Sys Demo</i>						
<b>Product Development (\$ in Millions)</b>				<b>FY 2020</b>		<b>FY 2021</b>		<b>FY 2022 Base</b>		<b>FY 2022 OCO</b>		<b>FY 2022 Total</b>				
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>	
Multi-Mission High Energy Laser (MMHEL) Integration and Demonstration	C/Various	SMDTC : Huntsville, AL	-	17.882		7.844		-		-		-	0.000	25.726	-	
<b>Subtotal</b>			-	17.882		7.844		-		-		-	0.000	25.726	N/A	
			<b>Prior Years</b>	<b>FY 2020</b>		<b>FY 2021</b>		<b>FY 2022 Base</b>		<b>FY 2022 OCO</b>		<b>FY 2022 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>	
<b>Project Cost Totals</b>			-	17.882		7.844		-		-		-	0.000	25.726	N/A	
<b>Remarks</b>																



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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2022 Army</b>			<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604115A / <i>Technology Maturation Initiatives</i>	<b>Project (Number/Name)</b> AX7 / <i>Multi-Mission High Energy Laser (MMHEL) Sys Demo</i>	

Event Name	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
MMHEL – Firing Doctrine and Exp Prototype System S/W	████████████████				████████████████																							
MMHEL – Experimental Prototype System Int / Checkout	██████████████				████████████████																							
MMHEL – Experimental Prototype System Dem / Assessment					████████████████																							

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604115A / <i>Technology Maturation Initiatives</i>	<b>Project (Number/Name)</b> AX7 / <i>Multi-Mission High Energy Laser (MMHEL) Sys Demo</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Multi-Mission High Energy Laser (MMHEL) ? System-Level Design	3	2018	4	2018
MMHEL ? Subsystem Design Refinement, Assembly, and Delivery	4	2018	4	2019
MMHEL ? Firing Doctrine and Exp Prototype System S/W	1	2019	3	2021
MMHEL ? Experimental Prototype System Int / Checkout	2	2019	4	2020
MMHEL ? Experimental Prototype System Dem / Assessment	4	2020	4	2021

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**Exhibit R-2A, RDT&E Project Justification:** PB 2022 Army **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4					<b>R-1 Program Element (Number/Name)</b> PE 0604115A / <i>Technology Maturation Initiatives</i>				<b>Project (Number/Name)</b> AX8 / <i>Adv Leth and Accuracy Sys for Med Calber (ALAS-MC)</i>			
COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
<i>AX8: Adv Leth and Accuracy Sys for Med Calber (ALAS-MC)</i>	-	24.731	-	24.700	-	24.700	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**Note**

The Project experiences a skip year in FY 2021.

**A. Mission Description and Budget Item Justification**

This Project matures and integrates next-generation 50mm weapon system technologies transitioned from under the Advanced Lethality and Accuracy System for Medium Caliber (ALAS-MC) advanced technology development effort into a vehicle-agnostic combat turret to inform requirements for the Next Generation Combat Vehicle (NGCV). This Project integrates and assesses critical ALAS-MC 50mm technology components for on-the-move engagement of moving personnel and materiel targets, bringing the subsystem to Technology Readiness Level (TRL) 7. Under Advanced Targeting and Lethality Automated System (ATLAS), this Project matures and integrates advanced Artificial Intelligence/Machine Learning (AI/ML) algorithms to enable aided target detection/recognition capability for NGCV using next generation, multi-spectral electro-optical and infrared (EO/IR) targeting sensors. AI/ML algorithms are integrated with real-time intelligent fire control and mission planning interfaces to demonstrate automated turret capabilities, and provide overmatch via reduced target acquisition and engagement timelines.

Work in this Project is related to and fully integrated with the efforts funded in PE 0603462A (Next Generation Combat Vehicle Advanced Technology) / Project BF5 (Adv Lethality & Accuracy Sys for Med Cal Adv Tech); and Project BG1 (Sensors for Auto Oper and Survivability Adv Tech).

The cited work is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Work in this Project is performed by Army Research, Development, Test and Evaluation (RDT&E) Enterprise.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	FY 2020	FY 2021	FY 2022
<b>Title:</b> Advanced Lethality and Accuracy System for Med Cal (ALAS-MC)	3.444	-	-
<b>Description:</b> This effort matures and integrates the next generation 50mm weapon system technologies transitioned from the ALAS-MC advanced technology development effort into vehicle-agnostic combat turret to inform requirements for the Next Generation Combat Vehicle.			
<b>Title:</b> Advanced Targeting and Lethality Automated System (ATLAS)	21.287	-	24.700
<b>Description:</b> The ATLAS effort matures, integrates, and demonstrates novel algorithms and sensor enhancements in a Next Generation Combat Vehicle (NGCV) vehicle agnostic, robotic turret. It integrates autonomous, wide-area search sensors and			

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604115A / <i>Technology Maturation Initiatives</i>	<b>Project (Number/Name)</b> AX8 / <i>Adv Leth and Accuracy Sys for Med Calber (ALAS-MC)</i>

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
<p>gimballed targeting sensors with real-time computer aided detection, recognition, and identification of threats for significantly decreased time to engagement. It integrates target acquisition with intelligent fire control system to demonstrate an end-to-end engagement system on NGCV platforms, and enable experimentation and soldier touch-points with robotic turret concepts.</p> <p><b>FY 2022 Plans:</b> Will integrate on the move target ID capability into the ATLAS system and perform data collection of the prototype system. Will begin interfacing the ATLAS system to the IVAS for Ground and vehicle video/data architecture systems.</p> <p><b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> Skip year in FY 2021. Technology Maturation Board reviewed progress and impact of the ATLAS program (through FY2020 evaluation) and recommended the effort continue in FY 2022.</p>			
<b>Accomplishments/Planned Programs Subtotals</b>	24.731	-	24.700

**C. Other Program Funding Summary (\$ in Millions)**

N/A

**Remarks**

**D. Acquisition Strategy**

N/A

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army** **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604115A / <i>Technology Maturation Initiatives</i>	<b>Project (Number/Name)</b> <i>AX8 I Adv Leth and Accuracy Sys for Med Calber (ALAS-MC)</i>
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<b>Product Development (\$ in Millions)</b>				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
ALAS-MC: Procure Ammo Rounds H/W	C/Variou	ARDEC : Picatinny, NJ	-	3.524		-		-		-		-	0.000	3.524	-
ALAS-MC: Control Unit	C/Variou	ARDEC : Picatinny, NJ	-	0.286		-		-		-		-	0.000	0.286	-
ALAS-MC: Test Hardware	TBD	ARDEC : Picatinny, NJ	-	0.191		-		-		-		-	0.000	0.191	-
ATLAS: System Design	TBD	CERDEC : Fort Belvoir, VA	-	4.762		-		-		-		-	0.000	4.762	-
ATLAS: Artificial Intelligence/Machine Learning Development	TBD	CERDEC : Fort Belvoir, VA	-	6.191		-		24.700		-		24.700	0.000	30.891	-
ATLAS: Data Collection and Synthetic Data	TBD	CERDEC : Fort Belvoir, VA	-	7.682		-		-		-		-	0.000	7.682	-
ATLAS: Integration and Test	TBD	CERDEC : Fort Belvoir, VA	-	1.333		-		-		-		-	0.000	1.333	-
<b>Subtotal</b>			-	23.969		-		24.700		-		24.700	0.000	48.669	N/A

<b>Support (\$ in Millions)</b>				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
ALAS-MC	TBD	ARDEC : Picatinny, NJ	-	0.762		-		-		-		-	0.000	0.762	-
<b>Subtotal</b>			-	0.762		-		-		-		-	0.000	0.762	N/A

	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract	
<b>Project Cost Totals</b>		-	24.731	0.000	24.700	-	24.700	0.000	49.431	N/A

**Remarks**

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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2022 Army</b>		<b>Date: May 2021</b>
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604115A / <i>Technology Maturation Initiatives</i>	<b>Project (Number/Name)</b> AX8 / <i>Adv Leth and Accuracy Sys for Med Calber (ALAS-MC)</i>

Event Name	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
ALAS-MC: Procure Ammo Rounds H/W		█	█	█																								
ALAS-MC: Control Unit			█	█																								
ALAS-MC: Test Hardware			█																									
ATLAS	█	█	█	█	█	█	█	█	█	█	█	█																
System Design	█	█	█	█																								
Data Collection and Synthetic Data	█	█	█	█																								
Integration and Test	█	█	█	█																								
AI/ML Development	█	█	█	█																								
Optimize ATLAS Target ID Algorithm for on the move									█	█	█	█																
Fabricate ATLAS Prototype for on move Target ID and eval via Soldier Touch Pt									█	█	█	█																
Prototype for on move Target ID and evaluation - Soldier Touch Pt																												

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604115A / <i>Technology Maturation Initiatives</i>	<b>Project (Number/Name)</b> AX8 / <i>Adv Leth and Accuracy Sys for Med Calber (ALAS-MC)</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
ALAS-MC: Procure Ammo Rounds H/W	2	2020	4	2020
ALAS-MC: Control Unit	3	2020	4	2020
ALAS-MC: Test Hardware	3	2020	3	2020
ATLAS	1	2020	4	2022
System Design	1	2020	4	2020
Data Collection and Synthetic Data	1	2020	4	2020
Integration and Test	1	2020	4	2020
AI/ML Development	1	2020	4	2020
Optimize ATLAS Target ID Algorithm for on the move	1	2022	4	2022
Fabricate ATLAS Prototype for on move Target ID and eval via Soldier Touch Pt	1	2022	4	2022
Prototype for on move Target ID and evaluation - Soldier Touch Pt	1	2023	1	2023

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army										<b>Date:</b> May 2021		
<b>Appropriation/Budget Activity</b> 2040 / 4					<b>R-1 Program Element (Number/Name)</b> PE 0604115A / <i>Technology Maturation Initiatives</i>				<b>Project (Number/Name)</b> AX9 / <i>Adv Mobility Experimental Prototype Adv Tech</i>			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022 Base</b>	<b>FY 2022 OCO</b>	<b>FY 2022 Total</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>FY 2026</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
<i>AX9: Adv Mobility Experimental Prototype Adv Tech</i>	-	10.068	15.209	12.500	-	12.500	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

This Project integrates and demonstrates advanced powertrain, power generation, and running gear technologies into a prototype ground combat vehicle. Advanced Mobility Experimental Prototype (AMEP) activities will demonstrate increased mobility, increased maneuver speeds, reduced fuel demands, and onboard power generation available for advanced lethality and protection technologies. The experimental prototype will be evaluated in realistic operating environment to validate performance and capability enhancements to inform ground combat vehicle programs of record.

This work is coordinated with PE 0603462A (Next Generation Combat Vehicle Advanced Technology) / BG4 (Adv Mobility Experimental Prototype Adv Tech Demo).

The cited work is consistent with the Under Secretary of Defense, Research and Engineering priority focus areas and the Army Modernization Strategy.

Work in this Project is performed by Army Research, Development, Test and Evaluation (RDT&E) Enterprise.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
<b>Title:</b> Advanced Mobility Experimental Prototype	10.068	15.209	12.500
<b>Description:</b> Efforts integrate and demonstrate advanced powertrain, power generation, running gear technologies, and unmanned robotic technologies into a ground combat vehicle to demonstrate reduced percentage of no go terrain for ground vehicles, increased maneuver speeds across all traversable terrain, reduced fuel demands thus extending operation time between resupply, and onboard power generation to enable the integration of energy based capabilities such as directed energy weapons and electromagnetic armor. This effort mitigates risk for the Self Propelled Howitzer and also supports power generation advances and propulsion systems for multi-platform insertion.			
<b>FY 2021 Plans:</b> Continue to develop and mature air induction/filtration, exhaust system, fuel cooling, final drives, and controls to integrate into experimental prototype and integrate higher capacity engine and transmission as well as improved track and suspension into a medium weight-class combat vehicle. Continue to demonstrate operational benefits of leader follower autonomous capability for unmanned combat vehicle formations.			
<b>FY 2022 Plans:</b>			



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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army		<b>Date:</b> May 2021		
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604115A / <i>Technology Maturation Initiatives</i>	<b>Project (Number/Name)</b> AX9 / <i>Adv Mobility Experimental Prototype Adv Tech</i>		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
<p>Will test the 1000hp AMEP powertrain and enhancements of the turret system. Will install AMEP powertrain on a Bradley Fighting Vehicle and perform extended Soldier trials/evaluations (1,000+hrs of driving) to evaluate performance, endurance, and compliance to environmental requirements (temperature range, dust/dirt, vibration, etc). Will prototype and evaluate the enhanced turret system with advanced munition loading capability and improved crew performance.</p> <p><b><i>FY 2021 to FY 2022 Increase/Decrease Statement:</i></b> Normal progression of the effort. Funding supports testing and evaluation of the prototype system.</p>				
<b>Accomplishments/Planned Programs Subtotals</b>		10.068	15.209	12.500
<b>C. Other Program Funding Summary (\$ in Millions)</b>				
N/A				
<b>Remarks</b>				
<b>D. Acquisition Strategy</b>				
N/A				

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army** **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604115A / <i>Technology Maturation Initiatives</i>	<b>Project (Number/Name)</b> AX9 / <i>Adv Mobility Experimental Prototype Adv Tech</i>
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<b>Product Development (\$ in Millions)</b>				<b>FY 2020</b>		<b>FY 2021</b>		<b>FY 2022 Base</b>		<b>FY 2022 OCO</b>		<b>FY 2022 Total</b>		<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>				
Design and Integration of Components	C/Various	GVSC : Warren, MI	-	0.909		6.100		5.000		-		5.000	5.000	17.009	-	
Develop air handling, cooling system, final drives & controls	C/Various	GVSC : Warren, MI	-	2.909		-		-		-		-	0.000	2.909	-	
Fabricate Powertrain Technologies	C/Various	GVSC : Warren, MI	-	3.409		-		-		-		-	0.000	3.409	-	
Fabricate Advanced Running Gear	C/Various	GVSC : Warren, MI	-	2.409		-		-		-		-	0.000	2.409	-	
Design Integration for Surrogate Platform	C/Various	GVSC : Warren, MI	-	0.432		-		-		-		-	0.000	0.432	-	
Component Fabrication	TBD	GVSC : Warren, MI	-	-		6.729		-		-		-	7.700	14.429	-	
Capability Demonstration	TBD	GVSC : Warren, MI	-	-		2.380		-		-		-	5.000	7.380	-	
Turret Enhancements	TBD	GVSC : Warren, MI	-	-		-		7.500		-		7.500	0.000	7.500	-	
<b>Subtotal</b>			-	10.068		15.209		12.500		-		12.500	17.700	55.477	N/A	
<b>Project Cost Totals</b>			-	10.068		15.209		12.500		-		12.500	17.700	55.477	N/A	

Remarks

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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2022 Army</b>			<b>Date: May 2021</b>
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604115A / <i>Technology Maturation Initiatives</i>	<b>Project (Number/Name)</b> AX9 / <i>Adv Mobility Experimental Prototype Adv Tech</i>	

Event Name	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Initial Design, Fabrication and Integration of Components	█																											
Demonstrate Technologies and Tele-Op capability																												
Perform Design, Fab. & Int. for 850 hp Propulsion and Leader/Follower	█																											
Demonstrate Technologies and Leader/Follower capability									█																			
Perform Design, Fab, & Int. of 1000 hp Prop., Adv. Susp., & Waypoint Following	█				█				█				█															
Demonstrate Technologies and Waypoint Navigation capability													█															
Durability Test & Evaluation													█															
Data Analysis and Final Report																	█											
Turret Enhancements									█				█															

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<b>Exhibit R-4A, RDT&amp;E Schedule Details: PB 2022 Army</b>		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604115A / <i>Technology Maturation Initiatives</i>	<b>Project (Number/Name)</b> AX9 / <i>Adv Mobility Experimental Prototype Adv Tech</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Initial Design, Fabrication and Integration of Components	1	2020	4	2020
Demonstrate Technologies and Tele-Op capability	4	2020	4	2020
Perform Design, Fab. & Int. for 850 hp Propulsion and Leader/Follower Capability	2	2020	3	2021
Demonstrate Technologies and Leader/Follower capability	3	2021	4	2021
Perform Design, Fab, & Int. of 1000 hp Prop., Adv. Susp., & Waypoint Following	1	2021	3	2023
Demonstrate Technologies and Waypoint Navigation capability	3	2022	4	2022
Durability Test & Evaluation	4	2022	2	2023
Data Analysis and Final Report	3	2023	4	2023
Turret Enhancements	1	2022	4	2023

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**Exhibit R-2A, RDT&E Project Justification:** PB 2022 Army **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604115A / <i>Technology Maturation Initiatives</i>	<b>Project (Number/Name)</b> AY1 / <i>MUM-T Platform Enabler</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
AY1: <i>MUM-T Platform Enabler</i>	-	6.904	4.332	-	-	-	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

**A. Mission Description and Budget Item Justification**

This Project will mature and demonstrate Manned Unmanned Teaming (MUMT) technologies in a realistic operating environment to drive down risk in three critical areas for ground MUMT: remote lethality, unmanned maneuver and network. These major technical hurdles will be addressed by integrating mature technologies into the MUMT Campaign of Learning through three, synergistic integration efforts: Unmanned Aerial Vehicle (UAV)/ground platform integration, a transportable MUMT simulation environment, and an advanced interface for the Warfighter.

Work within this Project supports the Army Modernization Priority for Next Generation Combat Vehicle.

The cited work is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Work in this Project is performed by Army Research, Development, Test and Evaluation (RDT&E) Enterprise.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	FY 2020	FY 2021	FY 2022
<p><b>Title:</b> Unmanned Aerial Vehicle / Ground Platform Integration</p> <p><b>Description:</b> This effort matures and demonstrates, in an operational environment, technologies that address critical capability challenges related to the integration of UAVs and ground vehicle platforms. This effort also improves human-machine interactions through an intuitive Warfighter Machine Interface (WMI) between operators and unmanned platforms. The end state is to analyze the operational impact of multiple advanced enabling technologies to reduce risk in critical capabilities that support MUMT operations.</p> <p><b>FY 2021 Plans:</b> Mature required subsystems based on lessons learned from engineering demonstrations and standardize interfaces for UAV to ground platform integration using simulators developed in FY 2020. Conduct operational demonstrations with users to evaluate the effectiveness of the integrated solution against their operational needs, shape future engineering work, and inform requirements development feedback into the Warfighter Machine Interface simulators developed in FY 2020. Produce final documentation of interfaces, architecture, requirements, and test data for delivery to Transition Partner.</p> <p><b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> Effort ends in FY 2021.</p>	3.917	4.332	-
<p><b>Title:</b> Transportable Manned Unmanned Teaming Simulation</p>	2.987	-	-

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604115A / <i>Technology Maturation Initiatives</i>	<b>Project (Number/Name)</b> AY1 / <i>MUM-T Platform Enabler</i>

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
<b>Description:</b> This effort provides an immersive, transportable MUMT simulation environment in order to gather insights from diverse user groups to shape and inform MUMT Tactics, Techniques and Procedures (TTPs). Specifically, it provides the capability to optimize Warfighter Machine Interface (WMI) implementations and advanced payloads for multiple MUMT scenarios. The end state is to provide Soldiers across the fighting echelon, from command to end user, the requisite knowledge to formulate the appropriate Concept of Operations (CONOPS) 7.200 for MUMT in order to operate and fight disbursed against near-peer adversaries with greater lethality and force projection.			
<b>Accomplishments/Planned Programs Subtotals</b>	6.904	4.332	-

**C. Other Program Funding Summary (\$ in Millions)**

N/A

**Remarks**

**D. Acquisition Strategy**

N/A

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army** **Date: May 2021**

<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604115A / <i>Technology Maturation Initiatives</i>	<b>Project (Number/Name)</b> AY1 / <i>MUM-T Platform Enabler</i>
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<b>Product Development (\$ in Millions)</b>				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
UAV / Ground Platform Integration	C/Various	TARDEC : Warren, MI	-	3.917		4.332		-		-		-	4.200	12.449	-
Transportable Simulator	C/Various	TARDEC : Warren, MI	-	2.987		-		-		-		-	0.000	2.987	-
<b>Subtotal</b>			-	6.904		4.332		-		-		-	4.200	15.436	N/A

			Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
<b>Project Cost Totals</b>			-	6.904	4.332	-	-	-	4.200	15.436	N/A

**Remarks**

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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2022 Army</b>			<b>Date: May 2021</b>		
<b>Appropriation/Budget Activity</b> 2040 / 4		<b>R-1 Program Element (Number/Name)</b> PE 0604115A / <i>Technology Maturation Initiatives</i>		<b>Project (Number/Name)</b> AY1 / <i>MUM-T Platform Enabler</i>	

Event Name	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
UAV/Ground Platform Integration																												
Transportable Simulator																												



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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604115A / <i>Technology Maturation Initiatives</i>	<b>Project (Number/Name)</b> AY1 / <i>MUM-T Platform Enabler</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
UAV/Ground Platform Integration	1	2020	4	2021
Transportable Simulator	2	2020	4	2021

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army	<b>Date:</b> May 2021
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<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604115A / <i>Technology Maturation Initiatives</i>	<b>Project (Number/Name)</b> AY2 / <i>Army Operational Fires</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
AY2: <i>Army Operational Fires</i>	-	18.122	17.336	37.832	-	37.832	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

**A. Mission Description and Budget Item Justification**

This Project matures and demonstrates a ground-launched, treaty-compliant weapon system capable of destroying critical relocatable, time sensitive targets in contested Anti-Access/Area Denied (A2/AD) environments. Activities include system-level prototyping to extend the range of Army fires well beyond 499km to complement other fires developments.

Work in this Project complements PE 0604182A (Hypersonics).

The cited work is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Work in this Project is performed by the Rapid Capabilities and Critical Technologies Office (RCCTO).

**B. Accomplishments/Planned Programs (\$ in Millions)**

	FY 2020	FY 2021	FY 2022
<b>Title:</b> Army Operational Fires	18.122	17.336	37.832
<b>Description:</b> This Project matures and demonstrates a ground-launched, treaty-compliant weapon system capable of destroying critical relocatable, time sensitive targets in contested Anti-Access/Area Denied (A2/AD) environments. Activities include system-level prototyping to extend the range of Army fires well beyond 499km to complement other fires developments.			
<b>FY 2021 Plans:</b> Mature fire control software development and launch platform hardware development; conduct end to end propulsion system integration and testing of developed propulsion booster system; and conduct system level critical design review (CDR) in preparation for final flight test hardware fabrication.			
<b>FY 2022 Plans:</b> Will continue maturation of Hypersonic Missile All-Up-Round (AUR) Hardware-in-the-Loop (HWIL) technology improvements. Will continue integrating AUR hardware and interfaces modifications with launch platform simulation, simulators, and actual equipment to enable system architecture and interface development between the AUR and the launch platform. Will continue to prototype the first fire control software of the rapid trajectory generator for the hypersonic weapon system and will mature the AUR missile booster stack for increased missile performance through weight reduction achieved by utilization of innovative advanced thermal			

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604115A / <i>Technology Maturation Initiatives</i>	<b>Project (Number/Name)</b> AY2 / <i>Army Operational Fires</i>

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
protection materials. Will conduct Short Hot Launch (SHOTL) test execution and post test data analysis of improved solid rocket booster subsystem design performance.  <b><i>FY 2021 to FY 2022 Increase/Decrease Statement:</i></b> The increase in funding is due to: - The execution of SHOTL test in 2Q FY2022. - The RTG demonstration in 2Q FY2022. - The GSE technical demonstration task will begin in FY2022 with the first demonstration planned in 3Q FY2022. - The technical maturation effort for performance improvement is conducted in 1Q FY2022.			
<b>Accomplishments/Planned Programs Subtotals</b>	18.122	17.336	37.832

**C. Other Program Funding Summary (\$ in Millions)**

N/A

**Remarks**

**D. Acquisition Strategy**

N/A



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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2022 Army</b>		<b>Date: May 2021</b>
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604115A / <i>Technology Maturation Initiatives</i>	<b>Project (Number/Name)</b> AY2 / <i>Army Operational Fires</i>

Event Name	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
AUR HWIL Prototype Tech Maturation																												
Rapic Trajectory Generator (RTG) Maturation																												
RTG Demonstration																												
Short Hot Launch																												
SHOTL test																												
Missile Booster Thermal Protection Manufacturing Tech Maturation																												
Ground Spt Equipment Tech Maturation																												
Tech Maturation for Performance Improvement																												
GSE Tech Maturation Demonstration #1																												

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<b>Exhibit R-4A, RDT&amp;E Schedule Details: PB 2022 Army</b>		<b>Date: May 2021</b>
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604115A / <i>Technology Maturation Initiatives</i>	<b>Project (Number/Name)</b> AY2 / <i>Army Operational Fires</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
AUR HWIL Prototype Tech Maturation	3	2020	2	2022
Rapic Trajectory Generator (RTG) Maturation	4	2020	1	2022
RTG Demonstration	2	2022	2	2022
Short Hot Launch	4	2020	3	2022
SHOTL test	3	2022	3	2022
Missile Booster Thermal Protection Manufacturing Tech Maturation	1	2021	4	2022
Ground Spt Equipment Tech Maturation	1	2022	4	2023
Tech Maturation for Performance Improvement	1	2022	2	2023
GSE Tech Maturation Demonstration #1	3	2022	3	2022

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army										<b>Date:</b> May 2021		
<b>Appropriation/Budget Activity</b> 2040 / 4					<b>R-1 Program Element (Number/Name)</b> PE 0604115A / <i>Technology Maturation Initiatives</i>				<b>Project (Number/Name)</b> AY3 / <i>Strategic Long Range Cannon</i>			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022 Base</b>	<b>FY 2022 OCO</b>	<b>FY 2022 Total</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>FY 2026</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
AY3: <i>Strategic Long Range Cannon</i>	-	76.698	62.769	-	-	-	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

This Project matures and integrates long-range armament technologies for both weapons and munitions to demonstrate potential deep strike objective capabilities from future cannon artillery systems. It will demonstrate revolutionary performance to support Long Range Fires by further developing, integrating, and demonstrating enhanced lethality and range extension solutions for cannon system performance with maximum effects. Strategic Long Range Cannon (SLRC) activities include integrating component technologies into sub-system and system-level experimental prototypes for novel cannon, munition, and fire control, including guidance and propulsion.

Extended Range Cannon Artillery (ERCA) activities mature, integrate, and demonstrate a novel sub-system for ammunition handling and a long-range artillery projectile to support prototyping and experimentation of a next-generation, extended range armaments system that will provide significantly increased range and accuracy without an increase in platform weight.

The cited work is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Work in this Project is performed by Army Research, Development, Test and Evaluation (RDT&E) Enterprise.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
<b>Title:</b> Strategic Long Range Cannon	61.806	62.769	-
<b>Description:</b> This effort will integrate and prototype subsystem technologies to further enhance range, lethality, and precision enablers for extended range cannon and munition systems.			
<b>FY 2021 Plans:</b> Mature critical sub-system technologies with major engineering tests on high risk components such as the rocket motor. Conduct static warhead testing to demonstrate performance against targets of interest. Conduct system integration and technology maturation for SLRC to include designs for long lead prototypes to be used in upcoming major system level demonstrations. Scale and perform prototyping on components including objective cannon, gun carriage, and test platform.			
<b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> This effort is projected to end in FY 2021. Funding was realigned to PE 0604115A / Project AX3 (Technology Maturation Initiatives).			
<b>Title:</b> Extended Range Cannon Artillery Autoloader	10.946	-	-

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604115A / <i>Technology Maturation Initiatives</i>	<b>Project (Number/Name)</b> AY3 / <i>Strategic Long Range Cannon</i>

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
<b>Description:</b> This effort matures, integrates, and demonstrates a novel technology sub-system prototype for ammunition handling to support the prototyping of a next-generation, extended range armaments system that will provide significantly increased range and accuracy without an increase in platform weight.			
<b>Title:</b> Extended Range Cannon Artillery Projectile	3.946	-	-
<b>Description:</b> This effort integrates component technologies that provide optimized range, precision, counter-measure, and payload into a long-range artillery projectile sub-system for demonstration and experimentation. Activities support the maturation and prototyping of a next-generation, extended range armaments system that will provide significantly increased range and accuracy without an increase in platform weight.			
<b>Accomplishments/Planned Programs Subtotals</b>	76.698	62.769	-

<b>C. Other Program Funding Summary (\$ in Millions)</b> N/A
<b>Remarks</b>
<b>D. Acquisition Strategy</b> N/A





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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2022 Army</b>			<b>Date: May 2021</b>
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604115A / <i>Technology Maturation Initiatives</i>	<b>Project (Number/Name)</b> AY3 / <i>Strategic Long Range Cannon</i>	

Event Name	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Strategic Long Range Cannon Hardware Contracting Activities																												
Extended Range Cannon Artillery (ERCA) Autoloader																												
Extended Range Cannon Artillery (ERCA) Projectile																												

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604115A / <i>Technology Maturation Initiatives</i>	<b>Project (Number/Name)</b> AY3 / <i>Strategic Long Range Cannon</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Strategic Long Range Cannon Hardware Contracting Activities	2	2020	4	2021
Extended Range Cannon Artillery (ERCA) Autoloader	1	2020	4	2020
Extended Range Cannon Artillery (ERCA) Projectile	1	2020	4	2020

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**Exhibit R-2A, RDT&E Project Justification:** PB 2022 Army **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4					<b>R-1 Program Element (Number/Name)</b> PE 0604115A / <i>Technology Maturation Initiatives</i>				<b>Project (Number/Name)</b> CE4 / <i>Emerging Technology Initiatives Development</i>			
COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
<i>CE4: Emerging Technology Initiatives Development</i>	-	-	-	42.420	-	42.420	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**Note**

This is a new start in FY 2022.

This project is considered a new start in FY2022.

**A. Mission Description and Budget Item Justification**

Emerging Technology Initiative Development projects address out-of-cycle advanced technologies that have emerged from DoD labs and centers, industry partners, Program Executive Offices (PEOs), and non-traditional vendors that potentially address existing Programs of Record (PoRs) requirements and require funding to expedite their transition for operational use. Funding will rapidly and efficiently prototype and demonstrate emerging technologies such as machine learning, human machine teaming, directed energy, hypersonics, advanced weapon systems, detection systems, and energy generation and storage.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	FY 2020	FY 2021	FY 2022
<p><b>Title:</b> Emerging Technology Initiatives Development</p> <p><b>Description:</b> Emerging technologies from the DoD enterprise or non-traditional vendors that require funding to expedite their transition to Programs of Record (PoRs) that are directed by the Army Technology Maturation Board could include machine learning, human machine teaming, directed energy, hypersonics, advanced weapon systems, detection systems, and energy generation and storage. Effort will evaluate and confirm component and subsystem maturation for integration in major systems to provide a strategic effect that addresses near-term and mid-term threats</p> <p><b>FY 2022 Plans:</b> Funds will support 3-Star Technology Maturation Board oversight as a mechanism to identify and select new and novel concepts and technologies for advanced development and transition to PoRs.</p> <p><b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> New Start in FY 2022.</p>	-	-	34.920
<p><b>Title:</b> Rapid Capabilities and Critical Technology Office (RCCTO) Innovation Funding</p> <p><b>Description:</b> Projects approved by the Army Rapid Capabilities and Critical Technology Office (RCCTO) Army Senior Leadership Board of Directors that address Army needs by integrating nontraditional innovators with the Army's research and development</p>	-	-	7.500

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army		<b>Date:</b> May 2021		
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604115A / <i>Technology Maturation Initiatives</i>	<b>Project (Number/Name)</b> CE4 / <i>Emerging Technology Initiatives Development</i>		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
ecosystem and accelerating transition to rapid fielding of their technology. Innovative Funding will fund technical scouting, concept incubation, staged pilot evaluations, and prototype development in Army-wide disciplines through rigorous technical assessment, Soldier feedback, and mentorship.				
<b>FY 2022 Plans:</b> Will conduct RCCTO sponsored Innovation Outreach Days and prize competitions with academia, small/non-traditional companies and the Defense Industrial Base seeking to apply their technology to prescribed Army capability gaps; execute pilot evaluations and/or prototype development for selected technology concepts.				
<b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> New Start in FY 2022. Funding was realigned from Abrams Recapitalization, Army Program Element (APE) GA0750000, (Abrams Upgrade Program).				
<b>Accomplishments/Planned Programs Subtotals</b>		-	-	42.420
<b>C. Other Program Funding Summary (\$ in Millions)</b>				
N/A				
<b>Remarks</b>				
<b>D. Acquisition Strategy</b>				
Based on projects selected and approved, efforts leverage a variety of contract vehicles, including Other Transaction Authority Agreements to complete the projects.				



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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2022 Army</b>			<b>Date: May 2021</b>
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604115A / <i>Technology Maturation Initiatives</i>	<b>Project (Number/Name)</b> CE4 / <i>Emerging Technology Initiatives Development</i>	

Event Name	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Emerging Technology Initiatives Development									[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]			
Rapid Capabilities and Critical Technology Office Innovation Funding									[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]			

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**Exhibit R-4A, RDT&E Schedule Details: PB 2022 Army** **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604115A / <i>Technology Maturation Initiatives</i>	<b>Project (Number/Name)</b> CE4 / <i>Emerging Technology Initiatives Development</i>
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Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Emerging Technology Initiatives Development	1	2022	4	2026
Rapid Capabilities and Critical Technology Office Innovation Funding	1	2022	1	2027



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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2022 Army **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040: <i>Research, Development, Test &amp; Evaluation, Army / BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0604117A / <i>Maneuver - Short Range Air Defense (M-SHORAD)</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	-	41.690	4.813	39.376	-	39.376	-	-	-	-	-	-
FI4: <i>Maneuver - Short Range Air Defense (M-SHORAD)</i>	-	41.690	4.813	39.376	-	39.376	-	-	-	-	-	-

**A. Mission Description and Budget Item Justification**

Maneuver-Short Range Air Defense (M-SHORAD) capabilities protect maneuvering forces by defeating, destroying, or neutralizing threat rotary-wing (RW), fixed-wing (FW), unmanned aircraft systems (UAS), rockets, artillery and mortar (RAM) capabilities. M-SHORAD is a Family of Systems (FoS) that perform operations to detect, track, and engage threat aerial objects without any external support. The M-SHORAD capability will be provided through a multi-phase approach including the rapidly fielded M-SHORAD Increment 1 (Inc. 1), formally known as Initial M-SHORAD system, and the follow-on M-SHORAD Increments 2 and 3 supported by a Joint Requirements Oversight Council approved Capability Development Document (CDD).

\* Inc. 1 system consists of existing capabilities integrated onto a Stryker A1 Double-V Hull (DVH) Infantry Carrier Vehicle (ICV) which includes the Reconfigurable Integrated-weapons Platform (RIWP) and Mission Equipment Package (MEP).

\* Inc. 2 is a 50 kilowatt(kW)-class laser integrated onto a Stryker combat Vehicle.

\* Inc. 3 will be the Next Generation interceptors to be compatible with Inc.1 platform.

**Budget Item Justification**

Key PB22 Activity:

M-SHORAD Inc. 1:

- First Fielding of 4 Systems (1 Platoon) April 2021
- Field 28 Systems (BN #1) 3Q-4QFY22
- Procure 37 Systems in FY22

M-SHORAD Inc. 2:

- Award OTA contract through RCCTO for prototyping
- Field prototype platoon

M-SHORAD Inc. 3:

- Pre-solicitation programmatic and technical activities

M-SHORAD programs will develop nascent capability and support Army demonstration and test initiatives to increase integrated offensive and defensive capability across warfighter functions and multiple domains.

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2022 Army	<b>Date:</b> May 2021
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<b>Appropriation/Budget Activity</b> 2040: <i>Research, Development, Test &amp; Evaluation, Army / BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0604117A / <i>Maneuver - Short Range Air Defense (M-SHORAD)</i>
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This program supports the Air and Missile Defense Cross Functional Team (CFT).

FY2021  
 The current funding shown is \$4.813M.  
 RDTE Funding increased by BTR of \$0.962M for a total funding value of \$5.8M in FY21.  
 The BTR amount of \$0.962M is currently not reflected in the cPROBE PB22 AF 3.3 database.  
 P&R Funding in FY21 will update when OSD receives an updated cPROBE data.  
 The PB22 APBB briefing slides includes the increased BTR funding for a total of \$5.8M in FY21.

<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022 Base</b>	<b>FY 2022 OCO</b>	<b>FY 2022 Total</b>
Previous President's Budget	42.900	4.995	39.863	-	39.863
Current President's Budget	41.690	4.813	39.376	-	39.376
Total Adjustments	-1.210	-0.182	-0.487	-	-0.487
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-1.210	-0.182			
• Adjustments to Budget Years	-	-	-0.487	-	-0.487

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army										<b>Date:</b> May 2021		
<b>Appropriation/Budget Activity</b> 2040 / 4					<b>R-1 Program Element (Number/Name)</b> PE 0604117A / <i>Maneuver - Short Range Air Defense (M-SHORAD)</i>				<b>Project (Number/Name)</b> F14 / <i>Maneuver - Short Range Air Defense (M-SHORAD)</i>			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022 Base</b>	<b>FY 2022 OCO</b>	<b>FY 2022 Total</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>FY 2026</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
F14: <i>Maneuver - Short Range Air Defense (M-SHORAD)</i>	-	41.690	4.813	39.376	-	39.376	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**Note**

FY2021  
 The current funding shown is \$4.813M.  
 RDTE Funding increased by BTR of \$0.962M for a total funding value of \$5.8M in FY21.  
 The BTR amount of \$0.962M is currently not reflected in the cPROBE PB22 AF 3.3 database.  
 P&R Funding in FY21 will update when OSD receives an updated cPROBE data.  
 The PB22 APBB briefing slides includes the increased BTR funding for a total of \$5.8M in FY21.

**A. Mission Description and Budget Item Justification**

Maneuver-Short Range Air Defense (M-SHORAD) capabilities protect maneuvering forces by defeating, destroying, or neutralizing threat rotary-wing (RW), fixed-wing (FW), unmanned aircraft systems (UAS), rockets, artillery and mortar (RAM) capabilities. M-SHORAD is a Family of Systems (FoS) that perform operations to detect, track, and engage threat aerial objects without any external support. The M-SHORAD capability will be provided through a multi-phase approach including the rapidly fielded M-SHORAD Increment 1 (Inc. 1), formally known as Initial M-SHORAD system, and the follow-on M-SHORAD Increments 2 and 3 supported by a Joint Requirements Oversight Council approved Capability Development Document (CDD).

\* Inc.1 system consists of existing capabilities integrated onto a Stryker A1 Double-V Hull (DVH) Infantry Carrier Vehicle (ICV) which includes the Reconfigurable Integrated-weapons Platform (RIWP) and Mission Equipment Package (MEP).

\* Inc. 2 is a 50 kilowatt(kW)-class laser integrated onto a Stryker combat Vehicle.

\* Inc. 3 will be the Next Generation interceptors to be compatible with Inc.1 platform.

Budget Item Justification

Key PB22 Activity:

M-SHORAD Inc. 1:

- First Fielding of 4 Systems (1 Platoon) April 2021
- Field 28 Systems (BN #1) 3Q-4QFY22
- Procure 37 Systems in FY22

M-SHORAD Inc. 2:

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army	<b>Date:</b> May 2021
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<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604117A / <i>Maneuver - Short Range Air Defense (M-SHORAD)</i>	<b>Project (Number/Name)</b> F14 / <i>Maneuver - Short Range Air Defense (M-SHORAD)</i>
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- Award OTA contract through RCCTO for prototyping  
 - Field prototype platoon  
 M-SHORAD Inc. 3:  
 - Pre-solicitation programmatic and technical activities

M-SHORAD programs will develop nascent capability and support Army demonstration and test initiatives to increase integrated offensive and defensive capability across warfighter functions and multiple domains.

This program supports the Air and Missile Defense Cross Functional Team (CFT).

**B. Accomplishments/Planned Programs (\$ in Millions)**

	FY 2020	FY 2021	FY 2022
<p><b>Title:</b> Initial M-SHORAD Materiel Development/Integration</p> <p><b>Description:</b> Develop, test and integrate the M-SHORAD system.</p> <p><b>FY 2021 Plans:</b></p> <ul style="list-style-type: none"> <li>- Management Services (\$0.4M)</li> <li>- Product Development (\$3.0M)</li> <li>- Support (\$1.0M)</li> <li>- Test &amp; Evaluation Support (\$1.4M)</li> </ul> <p><b>FY 2022 Plans:</b></p> <p>Inc.1. (\$13.6M)                      Engineering &amp; Technical Support- This RDTE funding supports OTA contracts for engineering design, analysis integration, and systems modifications for obsolescence associated with internal radar and command and control systems. Additionally, other product improvements are required to advance the discharge of 30mm munitions and modernize GPS equipment for GPS- denied environments. (\$9.7M)                      Technical Support- This RDTE funding supports personnel assigned to government organizations to manage the various product improvements associated with OTA contracts. (\$3.9M)</p> <p>Inc.2. (\$24.6M)                      Program Management - Personnel in support of M-SHORAD Product Office (contractor support). FY22 PM costs support Inc.2 planning. Current funding for Inc. 2 supports personnel currently working in the Inc. 2 PO. The PO plans to transition the Inc. 2 team in FY24 to M-SHORAD PO. (\$2.3M).</p>	41.690	4.813	39.376

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604117A / <i>Maneuver - Short Range Air Defense (M-SHORAD)</i>	<b>Project (Number/Name)</b> F14 / <i>Maneuver - Short Range Air Defense (M-SHORAD)</i>

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
System Development, Prototypes and Integration - RDTE dollars placed through Rapid Capabilities and Critical Technologies Office (RCCTO) OTA contract for vendors that produce components and integrate M-SHORAD Inc. 2 System. (\$22.3M).  Inc.3. (\$1.2M) Prepare RFIs, conduct Industry Day, review white papers for Next Generation Interceptors. Industry Day will provide information for qualified contractors for a competitive shoot-off.  <b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> Overall M-SHORAD Materiel Development/Integration funding increase supports Inc. 2 and future Increment development, integration, and planning for Inc. 3.			
<b>Accomplishments/Planned Programs Subtotals</b>	41.690	4.813	39.376

<b>C. Other Program Funding Summary (\$ in Millions)</b>											
<b>Line Item</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022 Base</b>	<b>FY 2022 OCO</b>	<b>FY 2022 Total</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>FY 2026</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
• C14301: <i>Maneuver - Short Range Air Defense (M-SHORAD)</i>	233.300	517.287	331.575	-	331.575	-	-	-	-	-	-

**Remarks**

**D. Acquisition Strategy**

M-SHORAD Inc.1  
Increment 1 is a rapid acquisition program responding to a Directed Requirement signed by the Chief of Staff of the Army on 21 February 2018 to provide a short-term solution to address the lack of air defense capability in current maneuver formations. Prototyping activities were conducted with three vendors. M-SHORAD awarded a contract on September 30, 2020 for the production of enough systems to field four M-SHORAD Battalions by the end of FY23.

M-SHORAD Inc. 2  
Increment 2 will begin transition from the Rapid Capabilities and Critical Technologies Office (RCCTO) to the M-SHORAD Product Office in FY22. The M-SHORAD product office will award a contract to buy up to eight additional vehicle prototypes; buy long lead-time items for two prototypes and initiate acquisition and contract documents to support future production decision

M-SHORAD Inc. 3  
Increment 3 will be the Next Generation kinetic effector interceptors.

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604117A / <i>Maneuver - Short Range Air Defense (M-SHORAD)</i>	<b>Project (Number/Name)</b> F14 / <i>Maneuver - Short Range Air Defense (M-SHORAD)</i>
M-SHORAD programs will develop nascent capability and support Army demonstration and test initiatives to increase integrated offensive and defensive capability across warfighter functions and multiple domains.		

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army** **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604117A / Maneuver - Short Range Air Defense (M-SHORAD)	<b>Project (Number/Name)</b> F14 / Maneuver - Short Range Air Defense (M-SHORAD)
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<b>Management Services (\$ in Millions)</b>				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Product Management Inc. 1	Various	Trident, Intuitive Research and others : Huntsville, Alabama	4.294	1.410	Oct 2019	0.376	Apr 2021	-		-		-	0.000	6.080	-
FY 2020 SBIR/STTR Transfer Inc. 1	TBD	Various : Various	-	1.210		-		-		-		-	0.000	1.210	-
Product Management Inc. 2	TBD	Trident, Intuitive Research and others : Huntsville, Alabama	-	-		-		2.300	Oct 2021	-		2.300	0.000	2.300	-
<b>Subtotal</b>			4.294	2.620		0.376		2.300		-		2.300	0.000	9.590	N/A

<b>Product Development (\$ in Millions)</b>				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Engineering & Technical Support Inc. 1	MIPR	Combat Capabilites Development Command : Redstone Arsenal, AL	1.781	1.367	Oct 2019	-		-		-		-	0.000	3.148	-
System Development, Prototypes and Integration Inc. 1	C/CPIF	Defense Ordnance Technology Consortium (DOTC) : Various	121.552	13.835	Oct 2019	2.037	Mar 2021	-		-		-	0.000	137.424	-
Government Furnished Equipment (GFE) Inc. 1	MIPR	Program Executive Officer Missiles and Space : Various	6.896	1.183	Oct 2019	-		-		-		-	0.000	8.079	-
Technical Support - Inc. 1	MIPR	Redstone Test Center (RTC) and White Sands Missile Range (WSMR) : Huntsville, AL	-	-		-		3.890	Oct 2021	-		3.890	0.000	3.890	-

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army** **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604117A / Maneuver - Short Range Air Defense (M-SHORAD)	<b>Project (Number/Name)</b> F14 / Maneuver - Short Range Air Defense (M-SHORAD)
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<b>Product Development (\$ in Millions)</b>				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Next Gen M-SHORAD Interceptor Inc. 3	Various	Contractor : TBD	-	-		-		1.186	Oct 2021	-		1.186	0.000	1.186	-
Engineering Changes from M-SHORAD (Inc. 1) Fielding	Various	Contractor : TBD	-	-		-		9.700	Feb 2022	-		9.700	0.000	9.700	-
System Development, Prototypes and Integration Inc. 2	Various	Defense Ordnance Technology Consortium (DOTC) : Various	-	-		-		22.300	Jan 2022	-		22.300	0.000	22.300	-
<b>Subtotal</b>			130.229	16.385		2.037		37.076		-		37.076	0.000	185.727	N/A

<b>Support (\$ in Millions)</b>				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Support Costs Inc. 1	MIPR	Aviation and Missiles Command (AMCOM) : Redstone Arsenal, AL	3.712	1.858	Oct 2019	1.000	May 2021	-		-		-	0.000	6.570	-
<b>Subtotal</b>			3.712	1.858		1.000		-		-		-	0.000	6.570	N/A

<b>Test and Evaluation (\$ in Millions)</b>				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Developmental Testing Inc. 1	MIPR	Redstone Test Center (RTC) and White Sands Missile Range (WSMR) : Redstone, AL and WSMR, NM	2.448	10.125	Oct 2019	-		-		-		-	0.000	12.573	-



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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army** **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604117A / <i>Maneuver - Short Range Air Defense (M-SHORAD)</i>	<b>Project (Number/Name)</b> F14 / <i>Maneuver - Short Range Air Defense (M-SHORAD)</i>
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<b>Test and Evaluation (\$ in Millions)</b>				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Test Support Inc. 1	MIPR	RTC, WSMR, Target Management Office and others : Redstone, AL and WSMR, NM	4.229	10.702	Oct 2019	1.400	Mar 2021	-		-		-	0.000	16.331	-
<b>Subtotal</b>			6.677	20.827		1.400		-		-		-	0.000	28.904	N/A
<b>Project Cost Totals</b>			144.912	41.690		4.813		39.376		-		39.376	0.000	230.791	N/A

**Remarks**  
 FY2021  
 The current funding shown is \$4.813M.  
 RDTE Funding increased by BTR of \$0.962M for a total funding value of \$5.8M in FY21.  
 The BTR amount of \$0.962M is currently not reflected in the cPROBE PB22 AF 3.3 database.  
 P&R Funding in FY21 will update when OSD receives an updated cPROBE data.  
 The PB22 APBB briefing slides includes the increased BTR funding for a total of \$5.8M in FY21.

Contract Award Dates based on Obligation start dates in PB22 APBB briefing.  
 Engineering Change Orders and Technical Support for Inc.1 will be awarded based on individual task orders.

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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2022 Army</b>		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604117A / Maneuver - Short Range Air Defense (M-SHORAD)	<b>Project (Number/Name)</b> F14 / Maneuver - Short Range Air Defense (M-SHORAD)

Event Name	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
M-SHORAD (Incr. 1) Material Development/Integration	[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]			
M-SHORAD (Incr. 1) Testing	[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]			
M-SHORAD (Incr. 1) Contract Definitization	[Redacted]				[Redacted]				3 M-SHORAD (Incr. 1) Contract Definitization				[Redacted]				[Redacted]				[Redacted]							
M-SHORAD (Incr. 1) UMR	[Redacted]				1 M-SHORAD (Incr. 1) UMR				[Redacted]				[Redacted]				[Redacted]				[Redacted]							
M-SHORAD (Incr. 1) First Unit Equipped (FUE)	[Redacted]				2 M-SHORAD (Incr. 1) First Unit Equipped (FUE)				[Redacted]				[Redacted]				[Redacted]				[Redacted]							
M-SHORAD (Incr. 2) Other Transactional Authority (OTA) Award	[Redacted]				[Redacted]				4 M-SHORAD (Incr. 2) Separate Other Transaction Agreement (OTA) using RCTO contr				[Redacted]				[Redacted]				[Redacted]							
M-SHORAD (Incr. 2) Prototyping	[Redacted]				[Redacted]				[Redacted]				5 M-SHORAD (Incr. 2) Prototyping				[Redacted]				[Redacted]							
M-SHORAD (Incr. 2) Prototype Platoon First Unit Issued	[Redacted]				[Redacted]				[Redacted]				7 M-SHORAD (Incr. 2) Prototype Platoon First Unit Issued				[Redacted]				[Redacted]							
M-SHORAD (Incr. 2) Production Decision	[Redacted]				[Redacted]				[Redacted]				7 M-SHORAD (Incr. 2) Production Decision				[Redacted]				[Redacted]							
M-SHORAD (Incr. 2) Production Contract Award	[Redacted]				[Redacted]				[Redacted]				[Redacted]				8 M-SHORAD (Incr. 2) Production Contract Award				[Redacted]							
M-SHORAD (Incr. 2) FUE	[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				8 M-SHORAD (Incr. 2) M-SHORAD FL							
M-SHORAD (Incr. 3) Request for Information and Industry Day	[Redacted]				[Redacted]				[Redacted]				6 M-SHORAD (Incr. 3) Request for Information and Industry Day				[Redacted]				[Redacted]							
M-SHORAD (Incr. 3) Other Transactional Authority (OTA) Award	[Redacted]				[Redacted]				[Redacted]				6 M-SHORAD (Incr. 3) OTA Award				[Redacted]				[Redacted]							

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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2022 Army</b>			<b>Date: May 2021</b>		
<b>Appropriation/Budget Activity</b> 2040 / 4		<b>R-1 Program Element (Number/Name)</b> PE 0604117A / Maneuver - Short Range Air Defense (M-SHORAD)		<b>Project (Number/Name)</b> F14 / Maneuver - Short Range Air Defense (M-SHORAD)	

Event Name	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
M-SHORAD (Incr. 3) Design, Development, Prototype Build & Performance Assessment																												

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<b>Exhibit R-4A, RDT&amp;E Schedule Details: PB 2022 Army</b>		<b>Date: May 2021</b>
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604117A / <i>Maneuver - Short Range Air Defense (M-SHORAD)</i>	<b>Project (Number/Name)</b> F14 / <i>Maneuver - Short Range Air Defense (M-SHORAD)</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Directed Requirement	2	2018	2	2018
M-SHORAD (Incr. 1) Material Development/Integration	4	2018	1	2020
M-SHORAD (Incr. 1) Testing	4	2019	1	2021
M-SHORAD (Incr. 1) Contract Definitization	4	2021	4	2021
M-SHORAD (Incr. 1) UMR	3	2021	3	2021
M-SHORAD (Incr. 1) First Unit Equipped (FUE)	3	2021	3	2021
M-SHORAD (Incr. 2) Other Transactional Authority (OTA) Award	2	2022	2	2022
M-SHORAD (Incr. 2) Prototyping	2	2022	4	2025
M-SHORAD (Incr. 2) Prototype Platoon First Unit Issued	4	2022	4	2022
M-SHORAD (Incr. 2) Production Decision	4	2023	4	2023
M-SHORAD (Incr. 2) Production Contract Award	1	2024	4	2031
M-SHORAD (Incr. 2) FUE	4	2025	4	2025
M-SHORAD (Incr. 3) Request for Information and Industry Day	2	2022	4	2022
M-SHORAD (Incr. 3) Other Transactional Authority (OTA) Award	2	2023	2	2023
M-SHORAD (Incr. 3) Design, Development, Prototype Build & Performance Assessment	2	2023	4	2028

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2022 Army **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040: <i>Research, Development, Test &amp; Evaluation, Army / BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0604119A / <i>Army Advanced Component Development &amp; Prototyping</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	-	117.335	172.990	189.483	-	189.483	-	-	-	-	-	-
BR2: <i>Advanced Component Development &amp; Prototyping</i>	-	117.335	172.990	189.483	-	189.483	-	-	-	-	-	-

**A. Mission Description and Budget Item Justification**

The Advance Component Development & Prototype budget line includes multiple efforts across the Army's Battlefield Operational Systems necessary to evaluate integrated technologies in the most high fidelity and realistic operating environment as possible to assess the performance or cost reduction potential of advanced technology.

Projects focus on proving component and subsystem maturity prior to integration in major and complex systems and may involve risk reduction initiatives. Efforts also includes advanced technology demonstrations to expedite technology transition from the laboratory to operational use, with the goal of transitioning systems into the acquisition process within the FYDP.

<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022 Base</b>	<b>FY 2022 OCO</b>	<b>FY 2022 Total</b>
Previous President's Budget	117.335	170.490	171.933	-	171.933
Current President's Budget	117.335	172.990	189.483	-	189.483
Total Adjustments	0.000	2.500	17.550	-	17.550
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-2.500			
• Congressional Rescissions	-	-			
• Congressional Adds	-	5.000			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	-	-	17.550	-	17.550

**Change Summary Explanation**

Funds increased for Army priorities

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**Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Army** **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040: <i>Research, Development, Test &amp; Evaluation, Army / BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0604120A / <i>Assured Positioning, Navigation and Timing (PNT)</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	-	-	115.688	96.679	-	96.679	-	-	-	-	-	-
BV4: <i>Area Protection and Alt Nav Technology Development</i>	-	-	18.152	16.516	-	16.516	-	-	-	-	-	-
ED5: <i>Assured Positioning, Navigation and Timing (PNT)</i>	-	-	26.222	21.192	-	21.192	-	-	-	-	-	-
EH8: <i>DISMOUNTED</i>	-	-	12.850	12.294	-	12.294	-	-	-	-	-	-
EJ2: <i>MOUNTED</i>	-	-	58.464	46.677	-	46.677	-	-	-	-	-	-

**A. Mission Description and Budget Item Justification**

The current Global Positioning System (GPS) capability is a fixed frequency system susceptible to electronic warfare and field environments (e.g. urban, dense vegetation). Assured Positioning, Navigation and Timing (APNT) provides Army ground maneuver forces access to assured PNT under conditions that may be limited or denied (jammed and spoofed) and in accordance with National Defense Authorization Act guidance. APNT products are ruggedized tactical systems that enable Army forces the ability to shoot, move, communicate, thereby allowing forces to maneuver from operational and strategic distances to close with, destroy, and exploit the enemy with sufficient combat power, tempo, and momentum. APNT addresses two critical capability gaps: Access and Integrity. Access is the ability to retrieve accurate PNT information in a contested Electronic Warfare/Cyber environment. Integrity is the ability to trust the PNT information. PNT is a critical enabler of many Army Maneuver, Fires, and Command and Control systems that are dependent on accurate Position and Timing, and a foundational Multi-Domain Battle capability to support: calibrated force posture (position and maneuver across strategic distances); multi-domain formations (operate in contested spaces against near-peer adversaries); convergence (continuous integration of capabilities in all domains).

Joint Requirements Oversight Council Memo (JROCM) 049-10, dated 05 April 2010, approved the PNT Assurance Initial Capabilities Document and designated the Army as the Lead Component for Assured PNT. Army Futures Command approved the Mounted APNT System (MAPS) Directed Requirement (DR) on 31 January 2019. The Dismounted APNT System (DAPS) Directed Requirement was approved 19 March 2019. The Alternative Navigation (ALTNAV) Directed Requirement was approved in 10 August 2019. On 12 September 2020, the Army Requirements Oversight Council (AROC) approved the MAPS Capabilities Development Document (CDD). DAPS CDD is planned to be approved in Fiscal Year (FY) 2021. Command, Control, Communications, Computers, Cyber, Intelligence, Surveillance, and Reconnaissance (C5ISR) Modular Open Suite of Standards (CMOSS) in support of House Report 116-442, 2020 efforts will prototype modular cards and software according to the Modular Open System Architecture (MOSA) standards, for future modernization and new weapons systems. In addition, the CMOSS Mounted Form Factor Abbreviated Capabilities Development Document (A-CDD) was approved in 2nd Quarter FY 2021.

APNT consists of four Projects; (BV4) Area Protection and ALTNAV Technology Development, (ED5) Assured PNT, (EH8) Dismounted APNT System (DAPS), and (EJ2) MAPS.

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2022 Army	<b>Date:</b> May 2021
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<b>Appropriation/Budget Activity</b> 2040: <i>Research, Development, Test &amp; Evaluation, Army / BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0604120A / <i>Assured Positioning, Navigation and Timing (PNT)</i>
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(BV4) - The Area Protection and Alt Nav Technology Development project supports the transition of technologies from industry, academia, and government Science & Technology organizations, and consequent development of alternative and complementary PNT technologies for integration into MAPS and Dismounted APNT System (DAPS). Area Protection & ALTNAV Technologies will be developed in order to demonstrate Modular Open System Architecture (MOSA), CMOSS, ALTNAV, Science & Technology emerging complementary PNT, and net-enabled GPS solutions to provide Radio Frequency (RF) and non-RF threat mitigation.

(ED5) - The Assured PNT project funding line is for Resiliency and Software Assurance Measures (RSAM) software upgrades to legacy military GPS receivers. Additionally, the Assured PNT project supports the development of Assured PNT enablers, network integration and certification of ALTNAV enterprise build out (ground). Completes critical timing and equipment upgrades. These connections, upgrades, and certification activities are critical to operationalizing ALTNAV as an effective and suitable contingency source of PNT data in the event GPS is denied/degraded.

(EH8) - The Dismounted APNT System (DAPS) will provide Dismounted Soldiers, Commanders, and Systems the resilient, survivable, Military Code (M-Code) capable timing and position data to effectively engage targets, share data across the network and conduct mission command in degraded or denied GPS environments.

(EJ2) - The MAPS is a platform-mounted, ruggedized tactical PNT system that provides electronic protection capabilities to provide Army forces the ability to move, shoot, communicate, and provide situational awareness in degraded or denied GPS environments.

<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022 Base</b>	<b>FY 2022 OCO</b>	<b>FY 2022 Total</b>
Previous President's Budget	0.000	128.125	66.661	-	66.661
Current President's Budget	0.000	115.688	96.679	-	96.679
Total Adjustments	0.000	-12.437	30.018	-	30.018
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-7.761			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-4.676			
• Adjustments to Budget Years	-	-	30.018	-	30.018

**Change Summary Explanation**

FY 2022 funding increased for MAPS platform integrations.

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army										<b>Date:</b> May 2021		
<b>Appropriation/Budget Activity</b> 2040 / 4					<b>R-1 Program Element (Number/Name)</b> PE 0604120A / <i>Assured Positioning, Navigation and Timing (PNT)</i>				<b>Project (Number/Name)</b> BV4 / <i>Area Protection and Alt Nav Technology Development</i>			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022 Base</b>	<b>FY 2022 OCO</b>	<b>FY 2022 Total</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>FY 2026</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
<i>BV4: Area Protection and Alt Nav Technology Development</i>	-	-	18.152	16.516	-	16.516	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

The primary focus of Area Protection and Alt Nav Technology Development is to enable the effective transition of incremental and disruptive technologies to fieldable Positioning, Navigation and Timing (PNT) solutions to pace or overmatch current and evolving threats and in accordance with National Defense Authorization Act (NDAA) Guidance (2021 NDAA: Section 1611). Program activities including advanced component development, prototyping, and demonstration to bridge the gap between advanced technology development (S&T) and system development (products). These activities demonstrate the military utility to enable effective transitions and synergize development across products.

Currently, military GPS is limited to specific frequency bands which could be defeated by our enemies. This project supports the Alternative Navigation (ALTNV) capability and complementary PNT technologies. ALTNV provides frequency and source diversity to enable Army users with accurate and assured position and time information in GPS degraded environments. Additional Radio Frequency (RF) signals such as Global Navigation Satellite Systems (GNSS) and other satellite communications (SATCOM) sources integrated into PNT products and user equipment will provide alternatives while operating in a GPS degraded environment. Complementary PNT technology will include network integration, installation and testing of the infrastructure capability and user equipment. Other efforts include the continuation of situational awareness development, spectrum modification for PNT solutions, and modeling and simulation support.

Prototyping efforts for modular cards and software are developed according to Command, Control, Communications, Computers, Cyber, Intelligence, Surveillance, and Reconnaissance (C5ISR) Modular Open Suite of Standards (CMOSS) (Reference House Report 116-442, 2020). Hardware and software technologies transitioned to Mounted Assured PNT System (MAPS) and Dismounted Assured PNT System (DAPS) programs of record will comply with the PNT Reference Architecture and Modular Open System Architecture (MOSA) compliant hardware; CMOSS and software frameworks (PNT Operating System (pntOS)), to ensure a plug and play capability. Utilization of these standards will be verified in the Open Innovation Lab (OIL).

Fiscal Year (FY) 2022 Base funds in the amount of \$16.516 Million support prototyping and technical validation of complementary PNT technologies; CMOSS design and platform integration; pntOS software development and OIL operations and testing.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
<b>Title:</b> Area Protection & Alt Nav Technology Development	-	18.152	16.516
<b>Description:</b> The effort supports complementary and Alternative Navigation (ALTNV) PNT capabilities.			
<b>FY 2021 Plans:</b>			



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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604120A / <i>Assured Positioning, Navigation and Timing (PNT)</i>	<b>Project (Number/Name)</b> BV4 / <i>Area Protection and Alt Nav Technology Development</i>

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
FY 2021 Base funds in the amount of \$18.152 Million support ALTNAV User Equipment characterization and optimization and prototyping and technical validation of complementary PNT technologies; Command, Control, Communications, Computers, Cyber, Intelligence, Surveillance, and Reconnaissance (C5ISR) Modular Open Suite of Standards (CMOSS) design and platform integration; pntOS software development and Open Innovation Lab (OIL) operations and testing.			
<b>FY 2022 Plans:</b> FY 2022 Base funds in the amount of \$16.516 Million will support prototyping and technical validation of complementary PNT technologies; C5ISR CMOSS design and platform integration; pntOS software development and OIL operations and testing.			
<b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> Area Protection and Alt Nav Technology Development RDT&E funding decreased from \$18.152 Million in FY 2021 to \$16.516 Million in FY 2022 due to reduced funding for Modular Open System Architecture (pntOS & CMOSS).			
<b>Accomplishments/Planned Programs Subtotals</b>	-	18.152	16.516

<b>C. Other Program Funding Summary (\$ in Millions)</b>											
<u>Line Item</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022</u> <u>Base</u>	<u>FY 2022</u> <u>OCO</u>	<u>FY 2022</u> <u>Total</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>FY 2026</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• EH8: <i>DISMOUNTED</i>	-	12.850	12.294	-	12.294	-	-	-	-	-	-
• EJ2: <i>MOUNTED</i>	-	58.464	46.677	-	46.677	-	-	-	-	-	-
• AW6: <i>Modular GPS Independent Sensors Advanced Tech</i>	-	10.684	6.813	-	6.813	-	-	-	-	-	-
• AV8: <i>Navigation Warfare (NAVWAR) Advanced Technology</i>	5.707	2.535	1.927	-	1.927	-	-	-	-	-	-
• 0603639A: <i>Tank and Medium Caliber Ammunition</i>	72.456	100.367	79.873	-	79.873	-	-	-	-	-	-

**Remarks**  
The project matures prototyping or other demonstrations to prove out technology before it is integrated into a Program of Record (PoR). This is solidified by the following linkage:

- Modular GPS Independent Sensors (AW6)
- Navigation Warfare (AV8)
- Tank and Medium Caliber Ammunition (0603639A)

Linked to:

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army	<b>Date:</b> May 2021
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<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604120A / <i>Assured Positioning, Navigation and Timing (PNT)</i>	<b>Project (Number/Name)</b> BV4 / <i>Area Protection and Alt Nav Technology Development</i>
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**C. Other Program Funding Summary (\$ in Millions)**

<u>Line Item</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022</u> <u>Base</u>	<u>FY 2022</u> <u>OCO</u>	<u>FY 2022</u> <u>Total</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>FY 2026</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
Area Protection and Alt Nav technology development (BV4)											
Linked to:											
Dismounted Assured PNT Systems (EH8)											
Mounted Assured PNT Systems (EJ2)											

**D. Acquisition Strategy**

Mounted Assured Positioning, Navigation, and Timing System (MAPS) Capabilities Development Document (CDD), Army Requirements Oversight Council (AROC) Approved, 12 September 2020.

MAPS Directed Requirement (DR), 31 January 2019.

Dismounted Assured Positioning, Navigation, and Timing System (DAPS) DR, 19 March 2019.

Alternative Navigation (ALTNAV) DR, 10 August 2019.

Command, Control, Communications, Computers, Cyber, Intelligence, Surveillance, and Reconnaissance (C5ISR) Modular Open Suite of Standards (CMOSS) Mounted Form Factor Abbreviated Capabilities Development Document (A-CDD), validated by GEN Murray on 4 January 2021.

Area Protection & Alt Nav Technology Development program will utilize prototyping and modeling & simulation to assess the military utility of advanced component capabilities through critical Soldier touchpoints, laboratory, and field assessments to determine technology maturation for integration into Mounted Assured Positioning, Navigation, and Timing System (MAPS) and Dismounted Assured Positioning, Navigation, and Timing System (DAPS). ALTNAV Enterprise Capability enhancements will be implemented by utilizing a mix of competitive Other Transaction Authority (OTA)'s and Federal Acquisition Regulation contracts. This will inform future MAPS and DAPS requirements.

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army** **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604120A / Assured Positioning, Navigation and Timing (PNT)	<b>Project (Number/Name)</b> BV4 / Area Protection and Alt Nav Technology Development
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<b>Management Services (\$ in Millions)</b>				<b>FY 2020</b>		<b>FY 2021</b>		<b>FY 2022 Base</b>		<b>FY 2022 OCO</b>		<b>FY 2022 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>			
Project Management Support	Various	Various : Various	-	-		0.911	Nov 2020	1.011	Nov 2021	-		1.011	0.000	1.922	-
<b>Subtotal</b>			-	-		0.911		1.011		-		1.011	0.000	1.922	N/A

<b>Product Development (\$ in Millions)</b>				<b>FY 2020</b>		<b>FY 2021</b>		<b>FY 2022 Base</b>		<b>FY 2022 OCO</b>		<b>FY 2022 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>			
ALTNAV Development	Various	Various : Various	-	-		1.927	Dec 2020	1.500	Dec 2021	-		1.500	0.000	3.427	-
Complementary PNT Modeling & Simulation, and Experimentation	Various	Various : Various	-	-		0.908	Apr 2021	0.600	Apr 2022	-		0.600	0.000	1.508	-
Modular Open System Architecture (pntOS & CMOSS)	Various	Various : Various	-	-		8.479	Nov 2020	6.691	Nov 2021	-		6.691	0.000	15.170	-
<b>Subtotal</b>			-	-		11.314		8.791		-		8.791	0.000	20.105	N/A

<b>Support (\$ in Millions)</b>				<b>FY 2020</b>		<b>FY 2021</b>		<b>FY 2022 Base</b>		<b>FY 2022 OCO</b>		<b>FY 2022 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>			
Engineering and Technical Services - Government	Various	C5ISR : Various	-	-		0.249	Nov 2020	0.256	Nov 2021	-		0.256	0.000	0.505	-
Engineering and Technical Services - Contractor	Various	DCS Corporation / MITRE / DOTC : APG, MD	-	-		4.790	Nov 2020	4.804	Nov 2021	-		4.804	0.000	9.594	-
<b>Subtotal</b>			-	-		5.039		5.060		-		5.060	0.000	10.099	N/A

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army** **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604120A / Assured Positioning, Navigation and Timing (PNT)	<b>Project (Number/Name)</b> BV4 / Area Protection and Alt Nav Technology Development
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<b>Test and Evaluation (\$ in Millions)</b>				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Open Innovation Lab (OIL)	MIPR	C5ISR : APG, MD	-	-		0.480	Nov 2020	1.234	Nov 2021	-		1.234	0.000	1.714	-
System Integration Lab (SIL)	MIPR	C5ISR : APG, MD	-	-		0.408	Feb 2021	0.420	Feb 2022	-		0.420	0.000	0.828	-
<b>Subtotal</b>			-	-		0.888		1.654		-		1.654	0.000	2.542	N/A

**Remarks**  
The Modular Integration Lab (MIL) was renamed to the Open Innovation Lab (OIL). The OIL conducts a recurring series of data driven demonstrations and evaluations of high Technical Readiness Level (TRL) operationally effective PNT solutions that transition to production easily in order to pace/overmatch enemy PNT threat systems.

	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
<b>Project Cost Totals</b>	-	-	18.152	16.516	-	16.516	0.000	34.668	N/A

**Remarks**

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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2022 Army</b>			<b>Date: May 2021</b>		
<b>Appropriation/Budget Activity</b> 2040 / 4		<b>R-1 Program Element (Number/Name)</b> PE 0604120A / Assured Positioning, Navigation and Timing (PNT)		<b>Project (Number/Name)</b> BV4 / Area Protection and Alt Nav Technology Development	

Event Name	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
ALTNAV Development	[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]			
Alt Nav Development																												
Complementary PNT Modeling & Simulation, and Experimentation	[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]			
Complementary PNT Modeling & Simulation, and Experimentation																												
PNT Technical Demonstrations & Testing	[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]			
Tech Demonstrations & Testing																												
Modular Opens Systems Architecture, PNT Operating System & CMOSS	[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]			
MoGIS, PntOS, CMOSS																												

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<b>Exhibit R-4A, RDT&amp;E Schedule Details: PB 2022 Army</b>		<b>Date: May 2021</b>
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604120A / <i>Assured Positioning, Navigation and Timing (PNT)</i>	<b>Project (Number/Name)</b> BV4 / <i>Area Protection and Alt Nav Technology Development</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
ALTNAV Development	2	2019	4	2022
Complementary PNT Modeling & Simulation, and Experimentation	2	2019	4	2022
PNT Technical Demonstrations & Testing	1	2020	4	2022
Modular Opens Systems Architecture, PNT Operating System & CMOSS	1	2021	4	2022

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army										<b>Date:</b> May 2021		
<b>Appropriation/Budget Activity</b> 2040 / 4					<b>R-1 Program Element (Number/Name)</b> PE 0604120A / Assured Positioning, Navigation and Timing (PNT)				<b>Project (Number/Name)</b> ED5 / Assured Positioning, Navigation and Timing (PNT)			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022 Base</b>	<b>FY 2022 OCO</b>	<b>FY 2022 Total</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>FY 2026</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
ED5: Assured Positioning, Navigation and Timing (PNT)	-	-	26.222	21.192	-	21.192	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

The Assured Positioning, Navigation and Timing (PNT) project funds the Resiliency and Software Assurance Measures (RSAM) which provides increased capability and situational awareness for fielded legacy military Global Positioning System (GPS) receivers supporting systems and soldiers through at least 2035. Legacy GPS receivers targeted for RSAM enhancements, include but are not limited to, 226,000 Defense Advanced GPS Receiver (DAGR) and 200,000+ embedded Ground Based-GPS Receiver Applications Module (GB-GRAM). RSAM software upgrades mitigate threats to legacy DAGR and GB-GRAM Selective Availability and Anti-Spoof Module (SAASM) based military GPS receivers. RSAM provides an interim solution in a GPS-challenged operational environment until future Positioning, Navigation and Timing (PNT) solutions are fully deployed. RSAM will coordinate integrated software testing with military system managers and the test community to validate software and synchronize RSAM deployment to the user. Additionally, the Assured PNT project supports the Alternative Navigation (ALTNAV) capability that will provide positioning and timing information for navigation for the Army, which completes critical timing and equipment upgrades, and key certification activities. These connections, upgrades, and certification activities are critical to operationalizing ALTNAV as an effective and suitable contingency source of PNT data in the event GPS is denied/degraded.

Fiscal Year (FY) 2022 base funds in the amount of \$21.192 Million support RSAM software enhancements to Army PNT receivers and capabilities, and development of Assured PNT enablers to include network integration and certification of ALTNAV enterprise build out (ground).

**B. Accomplishments/Planned Programs (\$ in Millions)**

	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
<b>Title:</b> Resiliency and Software Assurance Measures (RSAM)	-	15.969	14.232
<b>Description:</b> Funding supports the following efforts:			
<b>FY 2021 Plans:</b>			
FY 2021 base funds in the amount of \$15.969 million support the release of RSAM GB-GRAM Update 1, support continued software development of RSAM DAGR Update 2 and RSAM GB-GRAM Update 2, to include prototype testing, formal qualification testing, and risk mitigation efforts. RSAM DAGR and GB-GRAM receiver integration testing efforts for Update 2 are performed in association with relevant military vehicles and systems.			
<b>FY 2022 Plans:</b>			

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604120A / <i>Assured Positioning, Navigation and Timing (PNT)</i>	<b>Project (Number/Name)</b> ED5 / <i>Assured Positioning, Navigation and Timing (PNT)</i>

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
<p>FY2022 base funds in the amount of \$14.232 Million will complete development of RSAM DAGR Update 2 and RSAM GB-GRAM Update 2, to include prototype testing, formal qualification testing, and risk mitigation efforts. RSAM DAGR and RSAM GB-GRAM receiver integration testing efforts for this update will be performed in association with military vehicles and systems.</p> <p><b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> Resiliency Software and Assurance Measures, Program Element (PE) 0604120A project ED5 funding decreased from \$15.969 Million in FY 2021 to \$14.232 Million in FY 2022 due to completion of software update to MicroGRAM receivers.</p>			
<p><b>Title:</b> Assured PNT Enablers</p> <p><b>Description:</b> Assured PNT Enablers.</p> <p><b>FY 2021 Plans:</b> FY 2021 base funds in the amount of \$10.253 million continue network integration, installation and testing of Alternative Navigation signal enterprise build-out.</p> <p><b>FY 2022 Plans:</b> FY 2022 base funds in the amount of \$6.960 million will support development of Assured PNT enablers to include network integration and certification of ALTNAV enterprise build out (ground).</p> <p><b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> Assured PNT Enablers, PE 0604120A project ED5 funding decreased from \$10.253 Million in FY 2021 to \$6.960 Million in FY 2022 due to reduced scope of Alternative Navigation enterprise build out (ground).</p>	-	10.253	6.960
<b>Accomplishments/Planned Programs Subtotals</b>	-	26.222	21.192

<b>C. Other Program Funding Summary (\$ in Millions)</b>											
<u>Line Item</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022</u> <u>Base</u>	<u>FY 2022</u> <u>OCO</u>	<u>FY 2022</u> <u>Total</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>FY 2026</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• K49010: <i>Mounted/Dismounted Receivers</i>	1.724	5.894	1.990	-	1.990	-	-	-	-	-	-

**Remarks**  
K49010 / Mounted/Dismounted Receivers is an OPA subset of Line Item Number K49000 / Assured Positioning, Navigation and Timing.

**D. Acquisition Strategy**  
PNT RSAM will provide software improvements to legacy military GPS receivers by awarding contracts to the original equipment manufacturer and leverage the test community to develop and characterize prototypes and final software solutions.



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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604120A / <i>Assured Positioning, Navigation and Timing (PNT)</i>	<b>Project (Number/Name)</b> ED5 / <i>Assured Positioning, Navigation and Timing (PNT)</i>

Assured PNT enablers will provide network integration and certification of ALTNAV enterprise build out (ground) by utilizing a mix of competitive Other Transaction Authority (OTA)'s and Federal Acquisition Regulation contracts.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army												Date: May 2021			
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)							
2040 / 4				PE 0604120A / Assured Positioning, Navigation and Timing (PNT)				ED5 / Assured Positioning, Navigation and Timing (PNT)							
Management Services (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Project Management Support	Various	Various : Various	2.693	-		0.921	Nov 2020	1.227	Nov 2021	-		1.227	0.000	4.841	-
<b>Subtotal</b>			2.693	-		0.921		1.227		-		1.227	0.000	4.841	N/A
Product Development (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
RSAM - DAGR Software Development	SS/CPFF	Rockwell Collins : Cedar Rapids, IA	1.168	-		5.750	Nov 2020	1.687	Oct 2021	-		1.687	0.000	8.605	-
RSAM - GB-GRAM Software Development	SS/CPFF	Rockwell Collins : Cedar Rapids, IA	2.902	-		5.499	Nov 2020	4.986	Nov 2021	-		4.986	0.000	13.387	-
Assured PNT Enablers	Various	Various : Various	5.177	-		10.253	Nov 2020	6.960	Nov 2021	-		6.960	0.000	22.390	-
RSAM - MicroGRAM Software Development	SS/CPFF	Rockwell Collins : Cedar Rapids, IA	2.158	-		-		-		-		-	0.000	2.158	-
<b>Subtotal</b>			11.405	-		21.502		13.633		-		13.633	0.000	46.540	N/A
Support (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Engineering and Technical Contracting Services	C/FFP	DCS Corp : APG, MD	9.445	-		1.558	Jan 2021	1.672	Oct 2021	-		1.672	0.000	12.675	-
Engineering and Technical Government Services	MIPR	Various : Various	3.049	-		1.141	Dec 2020	1.542	Nov 2021	-		1.542	0.000	5.732	-
<b>Subtotal</b>			12.494	-		2.699		3.214		-		3.214	0.000	18.407	N/A

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army** **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604120A / <i>Assured Positioning, Navigation and Timing (PNT)</i>	<b>Project (Number/Name)</b> ED5 / <i>Assured Positioning, Navigation and Timing (PNT)</i>
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<b>Test and Evaluation (\$ in Millions)</b>				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
RSAM - Government Engineering Support	MIPR	Various : Various	3.819	-		0.384	Mar 2021	0.558	Nov 2021	-		0.558	0.000	4.761	-
RSAM - Contractor Engineering Support	Various	Various : APG, MD	2.270	-		0.396	Mar 2021	2.380	Nov 2021	-		2.380	0.000	5.046	-
Platform Integration Testing	Various	Various : Various	0.535	-		-		-		-		-	0.000	0.535	-
RSAM Test Equipment	Various	Various : Various	0.414	-		0.320	Mar 2021	0.180	Mar 2022	-		0.180	0.000	0.914	-
<b>Subtotal</b>			7.038	-		1.100		3.118		-		3.118	0.000	11.256	N/A

**Remarks**  
The increased FY22 test cost is to complete the software and platform integration testing for the RSAM Update 2 to DAGR and GB-GRAM.

	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
<b>Project Cost Totals</b>	33.630	-	26.222	21.192	-	21.192	0.000	81.044	N/A

**Remarks**

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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2022 Army</b>		<b>Date: May 2021</b>
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604120A / Assured Positioning, Navigation and Timing (PNT)	<b>Project (Number/Name)</b> ED5 / Assured Positioning, Navigation and Timing (PNT)

Event Name	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
RSAM Update 1	[Bar]				[Bar]																							
RSAM DAGR Software Development and Testing Update 1	[Bar]				[Bar]																							
RSAM GB-GRAM Software Development & Testing Update 1	[Bar]				[Bar]																							
Platform Integration Testing Update 1	[Bar]				[Bar]																							
RSAM DAGR Software Release Update 1					▲ 1 DAGR Update 1 Release																							
RSAM GB-GRAM Update 1 Software Release					▲ 2 GB-GRAM Update 1 Release																							
RSAM Update 2	[Bar]				[Bar]				[Bar]																			
RSAM DAGR Software Development and Testing Update 2	[Bar]				[Bar]				[Bar]																			
RSAM GB-GRAM Software Development and Testing Update 2	[Bar]				[Bar]				[Bar]																			
Platform Integration Testing Update 2	[Bar]				[Bar]				[Bar]																			
RSAM DAGR Update 2 Software Release													▲ 3 DAGR Update 2 Release															
RSAM GB-GRAM Update 2 Software Release													▲ 4 GB-GRAM Update 2 Release															
RSAM DAGR and GB-GRAM Post Software Release Support					[Bar]				[Bar]				[Bar]				[Bar]				[Bar]							

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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2022 Army</b>		<b>Date: May 2021</b>
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604120A / Assured Positioning, Navigation and Timing (PNT)	<b>Project (Number/Name)</b> ED5 / Assured Positioning, Navigation and Timing (PNT)

Event Name	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Assured PNT Enablers																												

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604120A / <i>Assured Positioning, Navigation and Timing (PNT)</i>	<b>Project (Number/Name)</b> ED5 / <i>Assured Positioning, Navigation and Timing (PNT)</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
RSAM Update 1	1	2019	2	2021
RSAM DAGR Software Development and Testing Update 1	1	2018	4	2020
RSAM GB-GRAM Software Development & Testing Update 1	1	2019	2	2021
Platform Integration Testing Update 1	1	2019	2	2021
RSAM DAGR Software Release Update 1	4	2020	4	2020
RSAM GB-GRAM Update 1 Software Release	2	2021	2	2021
RSAM Update 2	4	2019	4	2022
RSAM DAGR Software Development and Testing Update 2	2	2020	4	2022
RSAM GB-GRAM Software Development and Testing Update 2	4	2020	1	2023
Platform Integration Testing Update 2	3	2021	1	2023
RSAM DAGR Update 2 Software Release	2	2023	2	2023
RSAM GB-GRAM Update 2 Software Release	4	2023	4	2023
RSAM DAGR and GB-GRAM Post Software Release Support	4	2020	4	2026
Assured PNT Enablers	1	2019	4	2022

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Army										Date: May 2021		
Appropriation/Budget Activity 2040 / 4					R-1 Program Element (Number/Name) PE 0604120A / Assured Positioning, Navigation and Timing (PNT)				Project (Number/Name) EH8 / DISMOUNTED			
COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
EH8: DISMOUNTED	-	-	12.850	12.294	-	12.294	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

Dismounted Assured PNT (APNT) System (DAPS) implements congressional and OSD guidance to develop and field Military Code (M-Code) Ground user Equipment (MGUE) to dismounted Soldiers, Commanders, and systems (e.g. Nett Warrior (NW), other Soldier architecture compliant systems, etc.), in order to provide the timing and position data necessary to effectively engage targets, share data across the network, and conduct mission command functions. DAPS is planned to deliver APNT in an optimized form factor that supports dismounted mission profiles in contested and denied environments and use cases where mounted APNT solutions are not available. DAPS includes the development of hardware and software to integrate M-Code, Global Positioning System (GPS), Alternative Navigation (ALTNV) signals, non-radio frequency (RF) sensors, and other PNT sources to generate and distribute a fused APNT solution to applicable End User Devices (EUD).

Fiscal Year (FY) 2022 Base funds in the amount of \$12.294 Million will support continued engineering development, production and manufacturing readiness, and Limited User Test (LUT) in preparation for Milestone C scheduled for 2nd Quarter (Q) FY 2023.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	FY 2020	FY 2021	FY 2022
<b>Title:</b> Dismounted APNT System (DAPS)	-	12.850	12.294
<b>Description:</b> This effort supports the DAPS hardware and software development, system engineering and client integration, development and operational testing, and program management efforts.			
<b>FY 2021 Plans:</b> FY 2021 Base funds in the amount of \$12.850 Million supports continued development of DAPS prototype variants, client system integration, development and operational assessment, and program management efforts.			
<b>FY 2022 Plans:</b> FY 2022 Base funds in the amount of \$12.294 Million will support continued engineering development, production and manufacturing readiness, and LUT in preparation for Milestone C scheduled for 2Q FY 2023.			
<b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> Funding decreased from \$12.850 Million in FY 2021 to \$12.294 Million in FY 2022. This reduction is due to reduced prototyping and engineering development efforts.			
<b>Accomplishments/Planned Programs Subtotals</b>	-	12.850	12.294

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604120A / <i>Assured Positioning, Navigation and Timing (PNT)</i>	<b>Project (Number/Name)</b> EH8 / <i>DISMOUNTED</i>

**C. Other Program Funding Summary (\$ in Millions)**

Line Item	FY 2020	FY 2021	FY 2022	FY 2022	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026	Cost To	
			Base	OCO	Total					Complete	Total Cost
• K49020: <i>Dismounted Hub</i>	-	48.449	32.643	-	32.643	-	-	-	-	-	-
• BV4: <i>Area Protection and Alt Nav Technology Development</i>	-	18.152	16.516	-	16.516	-	-	-	-	-	-

**Remarks**

K49020 / Dismounted Hub is an OPA subset of Line Item Number 9897K49000 / Assured Positioning, Navigation and Timing.

Risk reduction prototyping efforts from 0604120A BV4 Area Protection and Alt Nav Technology Development will transition PNT Modernization/complementary PNT capabilities to the DAPS.

**D. Acquisition Strategy**

The DAPS acquisition strategy consists of an iterative development operations (DevOps) methodology for the development, testing, production and fielding of a material solution that implements Congressional guidance for M-Code capability (10 USC 2281), modular open systems architecture (10 USC 2446a), and the DAPS Capability Development Document (approval planned for 4Q FY 2021) performance requirements. The DAPS strategy leverages competitive Other Transaction Authority (OTA) agreements and Small Business Innovative Research (SBIR) contracts to assess industry capabilities, develop prototypes, and mature technology upgrades. Developmental test and operational assessment results will inform a best value decision in September 2021 of the selected material solution for final engineering development, production and manufacturing readiness, and LUT. LUT results will inform a major capabilities acquisition program Milestone C decision in 2Q FY 2023.

DAPS requirement documents include:

Quick Reaction Capability (QRC): DAPS Directed Requirement (19 Mar 2019), Alternative Navigation Directed Requirement (10 August 2019), APNT Requirements Trace and Concurrence for DAPS with ALTNV Handheld Devices memorandum (16 April 2020).

Program of Record (POR): DAPS Capabilities Development Document (CDD) (Planned 4Q FY 2021).

DAPS Milestone C shifts from 3Q FY 2021 to 2Q FY 2023 to accommodate additional Quick Reaction Capability (QRC) equipping, additional material solution development, and incorporation of lessons learned from the QRC into the DAPS Program of Record. DAPS will complete development, testing and evaluation in FY 2022 ahead of Low Rate Initial Production (LRIP).



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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army** **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604120A / <i>Assured Positioning, Navigation and Timing (PNT)</i>	<b>Project (Number/Name)</b> EH8 / <i>DISMOUNTED</i>
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<b>Management Services (\$ in Millions)</b>				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Project Management Support - Contractor	Various	Various : Various	-	-		0.699	Dec 2020	0.567	Dec 2021	-		0.567	0.000	1.266	-
<b>Subtotal</b>			-	-		0.699		0.567		-		0.567	0.000	1.266	N/A

<b>Product Development (\$ in Millions)</b>				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
DAPS Prototyping & Engineering Development, Production & Manufacturing Readiness	MIPR	Various : Various	-	-		7.537	Dec 2020	5.071	Dec 2021	-		5.071	0.000	12.608	-
Engineering and Technical Product Development	MIPR	C5ISR : APG, MD	-	-		1.825	Dec 2020	1.244	Dec 2021	-		1.244	0.000	3.069	-
<b>Subtotal</b>			-	-		9.362		6.315		-		6.315	0.000	15.677	N/A

<b>Support (\$ in Millions)</b>				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Engineering and Technical Services - Government	Various	C5ISR : Various	-	-		0.284	Nov 2020	0.388	Nov 2021	-		0.388	0.000	0.672	-
Engineering and Technical Services - Contractor	C/CPFF	DCS Corporation : APG, MD	-	-		0.344	Dec 2020	0.356	Dec 2021	-		0.356	0.000	0.700	-
<b>Subtotal</b>			-	-		0.628		0.744		-		0.744	0.000	1.372	N/A

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army** **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604120A / Assured Positioning, Navigation and Timing (PNT)	<b>Project (Number/Name)</b> EH8 / DISMOUNTED
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Test and Evaluation (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Test and Evaluations	MIPR	Various : Various	-	-		2.161	Dec 2020	4.668	Dec 2021	-		4.668	0.000	6.829	-
<b>Subtotal</b>			-	-		2.161		4.668		-		4.668	0.000	6.829	N/A

**Remarks**  
Test and Evaluation costs in FY22 increased for development test and Limited User Test in support of Milestone C decision.

	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
<b>Project Cost Totals</b>	-	-	12.850	12.294	-	12.294	0.000	25.144	N/A

**Remarks**

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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2022 Army</b>		<b>Date: May 2021</b>
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604120A / Assured Positioning, Navigation and Timing (PNT)	<b>Project (Number/Name)</b> EH8 / DISMOUNTED

Event Name	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
DAPS Quick Reaction Capability (QRC) Prototyping	QRC Prototyping																											
DAPS Quick Reaction Capability (QRC) Testing and Analyses					QRC Testing and Analyses																							
DAPS Quick Reaction Capability (QRC) Production & Equipping					QRC Production & Equipping																							
DAPS Capability Development Document (CDD)					1 CDD																							
DAPS Program of Record (POR) Engineering Development for Production									DAPS POR Engineering Development for Production																			
DAPS Milestone C Production Decision													2 Milestone C Production Decision															
DAPS Low Rate Initial Production (LRIP)													DAPS LRIP															
DAPS Production																	DAPS Production											
DAPS Fielding																	DAPS Fielding											

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604120A / <i>Assured Positioning, Navigation and Timing (PNT)</i>	<b>Project (Number/Name)</b> EH8 / <i>DISMOUNTED</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
DAPS Quick Reaction Capability (QRC) Prototyping	2	2019	4	2021
DAPS Quick Reaction Capability (QRC) Testing and Analyses	2	2021	1	2022
DAPS Quick Reaction Capability (QRC) Production & Equipping	3	2021	2	2023
DAPS Capability Development Document (CDD)	4	2021	4	2021
DAPS Program of Record (POR) Engineering Development for Production	1	2022	2	2023
DAPS Milestone C Production Decision	2	2023	2	2023
DAPS Low Rate Initial Production (LRIP)	2	2023	2	2024
DAPS Production	3	2024	2	2028
DAPS Fielding	3	2024	4	2028

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**Exhibit R-2A, RDT&E Project Justification:** PB 2022 Army **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604120A / <i>Assured Positioning, Navigation and Timing (PNT)</i>	<b>Project (Number/Name)</b> EJ2 / <i>MOUNTED</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
EJ2: <i>MOUNTED</i>	-	-	58.464	46.677	-	46.677	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

**A. Mission Description and Budget Item Justification**

The Mounted Assured Positioning, Navigation and Timing System (MAPS GEN II) will meet congressional (10 USC 2281) and Department of Defense guidance to provide resilient, survivable, M-Code capable Ground User Equipment (MGUE) receivers. The MAPS will provide Army ground maneuver and strategic forces access to assured PNT information utilizing various sources of PNT data to address multiple threats and ensure mission success where Global Positioning System (GPS) may be limited or denied. The MAPS GEN II is comprised of two subsystems: a internally mounted navigation hub where data from sensors and receivers (to include M-code) are fused together to distribute an assured PNT solution to the platform and onboard client systems and an Anti-Jam antenna (AJAS) mounted externally on the platform to protect access to GPS and receive Alternative Navigation signals. The MAPS will enable critical Army Maneuver, Fires, Communications, Command (to include Blue Force Tracking), and Air Defense capabilities that are dependent on accurate position and timing data. The MAPS GEN II will be integrated into prioritized platforms in Armored, Stryker and Infantry Brigade Combat Teams and Key Strategic Units in order to conduct Multi-Domain Operations (MDO).

Fiscal Year (FY) 2022 Base dollars in the amount of \$46.677 Million support system engineering and management support, platform and client integration, and testing of the MAPS capability for 18 host platforms. Milestone Decision C / Low Rate Initial Production (LRIP) Decision and award of the production contract are critical events planned for 2nd Quarter (Q) FY 2022.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	FY 2020	FY 2021	FY 2022
<b>Title:</b> Mounted APNT System (MAPS)	-	58.464	46.677
<b>Description:</b> Funding supports MAPS GEN II hardware and software development, systems engineering, platform and client system integration, development and operational testing, and program management efforts.			
<b>FY 2021 Plans:</b> FY 2021 Base dollars in the amount of \$58.464 Million supports MAPS GEN II hardware and software engineering development, manufacturing readiness (production maturation), host platform and client integration (Double-Vee Hull Stryker variants, Joint Light Tactical Vehicles, Abrams M1A2 SEP V3, Bradley M2A4, Paladin M109A7), development, and program management activities. The year will culminate with a Limited User Test conducted with Soldiers conducting operational maneuver on Strykers.			
<b>FY 2022 Plans:</b> FY 2022 Base dollars in the amount of \$46.677 Million supports software integration, manufacturing readiness (production maturation), client system and platform integration and testing for 18 platforms, and program management activities. Milestone C is scheduled for 2Q FY 2022.			
<b>FY 2021 to FY 2022 Increase/Decrease Statement:</b>			

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army	<b>Date:</b> May 2021
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<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604120A / <i>Assured Positioning, Navigation and Timing (PNT)</i>	<b>Project (Number/Name)</b> EJ2 / <i>MOUNTED</i>
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<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	FY 2020	FY 2021	FY 2022
Funding decreased from \$58.464 Million in FY 2021 to \$46.677 Million in FY 2022 due to reduced MAPS system engineering management efforts leading to Milestone C and testing.			
<b>Accomplishments/Planned Programs Subtotals</b>	-	58.464	46.677

**C. Other Program Funding Summary (\$ in Millions)**

Line Item	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
• K49030: <i>Mounted Hub A-PNT</i>	41.728	86.610	80.658	-	80.658	-	-	-	-	-	-
• BV4: <i>Area Protection and Alt Nav Technology Development</i>	-	18.152	16.516	-	16.516	-	-	-	-	-	-

**Remarks**  
 K49030 / Mounted Hub APNT is an OPA subset of Line Item Number 9897K49000 / Assured Positioning, Navigation and Timing.  
  
 0604120A BV4 Area Protection and Alt Nav Technology Development will transition PNT Modernization/complementary PNT capabilities to the MAPS.

**D. Acquisition Strategy**  
 The MAPS acquisition strategy consists of an iterative development operations methodology for the development, testing, production and fielding of a material solution that implements Congressional guidance for M-Code capability (10 USC 2281), modular open systems architecture (10 USC 2446a), and the MAPS Capability Development Document (approved 12 September 2020) performance requirements. The MAPS strategy leverages competitive Other Transaction Authority (OTA) agreements to assess industry capabilities, develop prototypes, and mature technology upgrades. Development test and operational assessment results informed a best value decision in September 2020 of the selected material solution for final engineering development, production and manufacturing readiness, and Limited User Test (LUT). LUT results will inform a major capabilities acquisition program Milestone C decision in 2Q FY 2022 and enable expedited fielding. A follow-on fixed priced type production contract to the OTA will be awarded following MS C and provide production representative test articles for Initial Operational Test and Evaluation in FY 2023 and demonstrate ramp-up capability to full rate productions quantities.

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army** **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604120A / Assured Positioning, Navigation and Timing (PNT)	<b>Project (Number/Name)</b> EJ2 / MOUNTED
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<b>Management Services (\$ in Millions)</b>				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Project Management Support	C/CPFF	Various : Various	-	-		1.430	Nov 2020	0.747	Jan 2022	-		0.747	0.000	2.177	Continuing
<b>Subtotal</b>			-	-		1.430		0.747		-		0.747	0.000	2.177	N/A

<b>Product Development (\$ in Millions)</b>				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Manufacturing Readiness (Product Maturation) Contract	C/FFP	Collins Aerospace : APG, MD	-	-		21.195	Nov 2020	6.715	Nov 2021	-		6.715	0.000	27.910	-
Mounted PNT Integration - Combat Platforms	C/CPFF	Various : Various	-	-		21.402	Mar 2021	8.949	Dec 2021	-		8.949	0.000	30.351	-
Mounted PNT Integration - Combat Support Platforms	C/CPFF	Various : Various	-	-		0.493	Nov 2020	8.371	Feb 2022	-		8.371	0.000	8.864	-
Mounted PNT Integration - Combat Systems Platforms	Various	Various : Various	-	-		0.469	Dec 2020	15.531	Feb 2022	-		15.531	0.000	16.000	-
Client Software Integration (MMC)	MIPR	AvMC / S3I : Huntsville, AL	-	-		0.805	Feb 2021	0.810	Jan 2022	-		0.810	0.000	1.615	-
Technical Manuals and Support Equipment	C/FFP	TBD : TBD	-	-		-		0.289	Dec 2021	-		0.289	0.000	0.289	Continuing
<b>Subtotal</b>			-	-		44.364		40.665		-		40.665	0.000	85.029	N/A

**Remarks**  
 Manufacturing Readiness (Product Maturation) will baseline the design, transition production processes for a ramp up and delivers hardware for the developmental and Limited User Tests that inform Milestone C in 2QFY2022.





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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2022 Army</b>		<b>Date: May 2021</b>
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604120A / <i>Assured Positioning, Navigation and Timing (PNT)</i>	<b>Project (Number/Name)</b> EJ2 / <i>MOUNTED</i>

Event Name	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Client and Platform Integration	[Blue bar spanning all quarters from FY 2020 to FY 2025]																											
Mounted APNT Prototyping and Testing - Phase 2	[Blue bar]				[Blue bar]																							
Operational Tech Demonstration				[Blue square]																								
Direct Requirement Decision Preferred Material Solution				[Blue triangle 1]																								
Production Maturation and Testing - Phase 3					[Blue bar]																							
Limited User / Development Test									[Blue bar]																			
Milestone C Low Rate Initial Production (LRIP) Decision																												
Production Contract Award																												
Initial Operational Test & Evaluation																												
Full Rate Production Decision																												
Follow on Test and Evaluation																												

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604120A / <i>Assured Positioning, Navigation and Timing (PNT)</i>	<b>Project (Number/Name)</b> EJ2 / <i>MOUNTED</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Client and Platform Integration	3	2019	4	2025
Mounted APNT Prototyping and Testing - Phase 1	1	2019	4	2019
Mounted APNT Prototyping and Testing - Phase 2	4	2019	4	2020
Operational Tech Demonstration	4	2020	4	2020
Direct Requirement Decision Preferred Material Solution	4	2020	4	2020
Production Maturation and Testing - Phase 3	4	2020	2	2022
Limited User / Development Test	3	2021	4	2021
Milestone C Low Rate Initial Production (LRIP) Decision	2	2022	2	2022
Production Contract Award	2	2022	2	2022
Initial Operational Test & Evaluation	4	2023	4	2023
Full Rate Production Decision	2	2024	2	2024
Follow on Test and Evaluation	4	2024	4	2024

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2022 Army **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040: Research, Development, Test & Evaluation, Army / BA 4: Advanced Component Development & Prototypes (ACD&P)	<b>R-1 Program Element (Number/Name)</b> PE 0604121A / Synthetic Training Environment Refinement & Prototyping
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	-	99.357	112.093	194.195	-	194.195	-	-	-	-	-	-
CR2: STE Information Systems (TSS, TMT)	-	-	-	104.903	-	104.903	-	-	-	-	-	-
CR3: STE Live	-	-	-	20.000	-	20.000	-	-	-	-	-	-
CR4: STE One World Terrain (OWT)	-	-	-	27.788	-	27.788	-	-	-	-	-	-
CR5: STE Reconfigurable Virtual Trainer (RVCT)	-	-	-	25.216	-	25.216	-	-	-	-	-	-
CR6: STE Squad Immersive Virtual Trainer (SiVT)	-	-	-	5.000	-	5.000	-	-	-	-	-	-
CR7: STE Soldier Virtual Trainer (SVT)	-	-	-	11.288	-	11.288	-	-	-	-	-	-
FD6: Synthetic Training Environment Refine & Prototype	-	27.975	105.354	-	-	-	-	-	-	-	-	-
SV1: Soldier/Squad Virtual Trainer	-	71.382	6.739	-	-	-	-	-	-	-	-	-

**Note**

In FY 2022, all requirements from Project FD6 - Synthetic Training Environment Refine & Prototype were realigned to Projects CR2 (STE Information Systems [TSS, TMT]), CR3 (STE Live), CR4 (STE One World Terrain [OWT]), CR5 (STE Reconfigurable Virtual Trainer [RVCT]), and CR7 (STE Soldier Virtual Trainer [SVT]).

In FY 2022, all requirements from Project SV1 - Soldier/Squad Virtual Trainer were realigned to Projects CR4 (STE One World Terrain [OWT]) and CR6 (STE Squad Immersive Virtual Trainer [SiVT]).

**A. Mission Description and Budget Item Justification**

The Synthetic Training Environment (STE) is the next generation holistic collective training capability that will enable leaders, Soldiers, and units to train where they will fight, with the partners they will fight with, and in complex operational environments to include dense urban, woodland, jungle, desert, and sub-terrain, before the first fight begins. STE will revolutionize Army training by providing the repetition necessary at the Point of Need for improved proficiency prior to live training or operations-improving Soldier lethality and survivability. The STE program is pre-acquisition and has 5 OTAs awarded in support of prototyping capabilities to an Initial Operating Capability (IOC) of FY 2023, and will implement an incremental fielding approach leveraging the Software Acquisition pathway. The STE will be available where training occurs (home station, combat training centers, armories, institutions, ship-board, deployed).

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2022 Army	<b>Date:</b> May 2021
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<b>Appropriation/Budget Activity</b> 2040: <i>Research, Development, Test &amp; Evaluation, Army / BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0604121A / <i>Synthetic Training Environment Refinement &amp; Prototyping</i>
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The STE is comprised of four main signature efforts: 1) STE-Information System (STE-IS); 2) Reconfigurable Virtual Collective Trainers (RVCT), both air and ground; 3) Soldier Virtual Trainer (SVT); and 4) STE LIVE. STE-IS is comprised of Synthetic Training Environment training capability consisting of One World Terrain (OWT), Training Simulation Software (TSS), and Training Management Tools (TMT). The RVCT Air and Ground (RVCT A/G) will allow units to collectively train, using proponent developed Combined Arms Training Strategies (CATS), on a simulated, fully interactive, real-time battlefield. S/SVT is broken into Squad Immersive Virtual Trainer (SiVT) and Soldier Virtual Trainer (SVT). Squad immersive Virtual Trainer (SiVT) is the immersive training capability delivered as part of the Integrated Visual Augmentation System (IVAS) for the close combat Squads that enables IVAS to be a fight, rehearse, and training platform. SVT, will provide training to Soldiers Army wide by providing a Weapons Skills Development (WSD), Joint Fires Trainer (JFT) and Use of Force (UoF). STE LIVE focuses on the development of twelve engagement types and five instrumentation enablers. The twelve engagement types are direct fire, counter-defilade fire, indirect fire, dropped objects, placed objects, thrown objects, guided weapons, autonomous weapons, cyber, directed energy, radiant energy, and plume; the five instrumentation enablers are calculations, networks, sensors, terrains, and transmitters. A future STE line of effort includes Next Generation Constructive.

FY 2022 Projects CR2 through CR7 Base RDTE dollars in the amount of \$194.195 million funds significant development efforts in the STE-Information System (STE-IS), One World Terrain (OWT), Reconfigurable Virtual Collective Trainer (RVCT), Squad Immersive Virtual Trainer (SiVT), Soldier Virtual Trainer (SVT), and STE-LIVE. NOTE - Projects CR2, CR3, CR4, CR6 and CR7 are not new starts; efforts were previously captured under projects FD6 and SV1.

<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022 Base</b>	<b>FY 2022 OCO</b>	<b>FY 2022 Total</b>
Previous President's Budget	103.621	129.547	10.658	-	10.658
Current President's Budget	99.357	112.093	194.195	-	194.195
Total Adjustments	-4.264	-17.454	183.537	-	183.537
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-28.126			
• Congressional Rescissions	-	-			
• Congressional Adds	-	15.400			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-4.264	-4.728			
• Adjustments to Budget Years	-	-	183.537	-	183.537

**Congressional Add Details (\$ in Millions, and Includes General Reductions)**

**Project:** FD6: *Synthetic Training Environment Refine & Prototype*

Congressional Add: *Congressional Add for STE-LIVE - (Army requested transfer from WTCV line 5)*

Congressional Add Subtotals for Project: FD6

Congressional Add Totals for all Projects

	<b>FY 2020</b>	<b>FY 2021</b>
	-	10.400
	-	10.400
	-	10.400

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040: <i>Research, Development, Test &amp; Evaluation, Army / BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0604121A / <i>Synthetic Training Environment Refinement &amp; Prototyping</i>	
<p><b><u>Change Summary Explanation</u></b></p> <p>FY 2022: Increase to PB of \$183.537 million will fund significant development efforts for the STE-Information System (STE-IS), Reconfigurable Virtual Collective Trainer (RVCT), Squad immersive Virtual Trainer (SiVT), Soldier Virtual Trainer (SVT), and STE-LIVE.</p> <p>This increase, in accordance with the Program Objective Memorandum Guidance for Fiscal Years 2023-2027, will be used to accelerate Synthetic Training Environment to increase small unit lethality. The increase in FY2022 supports the incorporating the revised A-CDD requirements for STE-IS and OWT to develop echelon software, support Aviation integration, initiate tactical terrain prototype development, in addition to, implementing DEVSECOPS and system integrating functions. Additionally, increase will finalize the technical development and demonstration of prototypes designs to facilitate production decisions for RVCT and follow-on production effort for SiVT. Lastly, FY2022 increase will support the acceleration of the STE-LIVE prototyping efforts and commence the prototyping efforts for SVT.</p>		

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army										<b>Date:</b> May 2021		
<b>Appropriation/Budget Activity</b> 2040 / 4					<b>R-1 Program Element (Number/Name)</b> PE 0604121A / <i>Synthetic Training Environment Refinement &amp; Prototyping</i>				<b>Project (Number/Name)</b> CR2 / <i>STE Information Systems (TSS, TMT)</i>			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022 Base</b>	<b>FY 2022 OCO</b>	<b>FY 2022 Total</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>FY 2026</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
CR2: <i>STE Information Systems (TSS, TMT)</i>	-	-	-	104.903	-	104.903	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**Note**  
This project is not a new start, efforts was previously captured under PE 604121A, Project FD6.

**A. Mission Description and Budget Item Justification**

The Training Simulation Software/Training Management Tools (TSS/TMT) will provide 2 of the 3 core function for the Synthetic Training Environment - Information Systems (STE-IS).TSS/TMT will provide a single, unified training & management environment where units from Soldier/Squad to Army Service Component Command (ASCC) train in the most appropriate live, virtual, constructive, or gaming environment or in all four at once.

The Training Simulation Software (TSS), the core STE simulation engine, provides the physical and behavior models necessary to replicate the operational environment to enable collective training from Soldier/Squad through ASCC. The TSS provides entity, aggregate, and common services, as well as adjudicates STE-IS interactions at the entity level (e.g., Computer-Generated Forces (CGF), and synthetic equipment). The Training Management Tool (TMT) is the capability that enables units to quickly plan collective training events, prepare training events; execute and monitor events, and assess event results and readiness. TMT provides an easy to use interface, combined with an Intelligent Tutor to reduce help-desk support, time, and manpower required for a training event. TMT will provide training management (data) services and authoritative data sources to enable training on demand to users regardless of geographic location.

In FY 2021, TSS/TMT adopted the execution of the Software Acquisition Pathway, tailored for software intensive systems. TSS/TMT plans to facilitate rapid and iterative delivery of the of its capabilities through Minimal Viable Products (MVP) and Minimum Viable Capability releases (MVCR) to support Squad (Sq) to Brigade (Bde) level training through 4QFY2023.

FY 2022 Base RDTE dollars in the amount of \$104.903 million for TSS/TMT will continue with the development of Minimal Viable Product (MVP) and delivery of Minimal Viable Capability Releases (MVCR) for the STE-IS to achieve a Squad to Company level training capability. Base funding will also continue the implementation of the DEVSECOPS process and software production pipeline to support STE-IS capability releases by echelons. Also, base funding will continue the development and integration of Avionics Software Emulation (AvSE) with TSS/TMT software baseline to support the RVCT Air capability.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
<b>Title:</b> Engineering, Support, Test & Evaluation for STE-IS	-	-	104.903
<b>FY 2022 Plans:</b>			

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604121A / <i>Synthetic Training Environment Refinement &amp; Prototyping</i>	<b>Project (Number/Name)</b> CR2 / <i>STE Information Systems (TSS, TMT)</i>

**B. Accomplishments/Planned Programs (\$ in Millions)**

	FY 2020	FY 2021	FY 2022
<p>Funding supports the STE-IS TSS/TMT continued prototype development of the Minimal Viable Products (MVPs), testing and release of capability releases to achieve Squad through Company training capability. Continued prototype development and testing will focus in the following areas:</p> <ul style="list-style-type: none"> <li>-- Architecture: continue with the development of a scalable/flexible Modular Open System Approach (MOSA) architecture to deliver collective training capability at the Point of Need (PoN). Continue development of open/common interface to support technology insertion and interoperability with STE lines of effort (i.e. - OWT, RVCT-Air, RVCT-Ground, RVCT-Soldier and SVT).</li> <li>-- TMT: continue with the development of the user interfaces that would enable Commanders and Leaders at the Squad through Company echelons to design exercises/scenarios</li> <li>-- TSS: continue with the development of the STE core simulation/game engine to provide a synthetic environment which enable collective training from Squad through Company across the Fires, Movement and Maneuver, and Mission Command warfighting functions.</li> <li>-- Integration: Continue the integration of TSS, TMT, OWT, RVCT-Air, RVCT-Ground, RVCT-Soldier, Avionics Software Emulation (AvSE) and Mission Command Information Systems (MCIS) to deliver and integrated, training capable STE-IS system to support Squad through Company collective training tasks.</li> <li>-- Test/Evaluation: Conduct evaluation of the TSS/TMT MVPs through technical assessments, Soldier Touch Points, Early User Test and test planning events to provide STE-IS capability by echelons.</li> <li>-- Continue the implementation of the DEVSECOPS process and software production pipeline to support STE-IS capability releases by echelons.</li> <li>-- Continue the development and integration of AvSE with TSS/TMT software baseline to ensure that the RVCT-Air capability is concurrent with Aviation platform systems.</li> </ul> <p><b><i>FY 2021 to FY 2022 Increase/Decrease Statement:</i></b> Increase in funding is due to new project line being established in FY22.</p>			
<b>Accomplishments/Planned Programs Subtotals</b>	-	-	104.903

**C. Other Program Funding Summary (\$ in Millions)**

N/A

**Remarks**

**D. Acquisition Strategy**

The TSS/TMT will be deployed as a software intensive program leveraging accelerated acquisition authorities such as the Software Acquisition Pathway. To ensure speed and agility to deliver and modernize STE, a modular open systems architecture (MOSA) will also be used to enable the Army to exploit rapid advancements in

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604121A / <i>Synthetic Training Environment Refinement &amp; Prototyping</i>	<b>Project (Number/Name)</b> CR2 / <i>STE Information Systems (TSS, TMT)</i>
<p>cutting-edge commercial technologies. Other acquisition elements such as testing, contracting, and technology transition will consider any and all means available to innovate and incorporate complementary support to add momentum in this approach.</p> <p>The TSS/TMT requirements are codified in the STE-IS abbreviated Capabilities Development Document (A-CDD) version 2, approved 2 June 2020. TSS/TMT was one of five (5) OTAs awarded in FY 2019 in support of the STE prototype initiatives which include: TSS/TMT, OWT, RVCT, Live (market research only), and SVT Weapons Optimization (market research only). Prime(s) and Sub-vendors will execute the STE agreement(s) through an Agile development process with established success criteria and their DevSecOps processes. Vendors will continually include the Government and all stakeholders (Internal and external) in the Agile development process. This process will ensure all parties have transparency and early input into the modular design effort in order to support success of the product(s) being developed for the STE.</p> <p>The initial TSS/TMT OTA, awarded in FY2019, commenced the prototype development and evaluation of minimal viable products (MVP) through technical assessments Soldier Touch Points, and test planning events. Additionally, the initial agreement allowed the Government to fully understand and decompose the requirements, establish/describe interfaces between TSS/TMT and RVCT, Avionics Software Emulation (AvSE) and OWT capabilities, and exposed the Government to the readiness of additional technologies that will enable the delivery of an integrated STE. These lesson learned, along with the incorporating the revised A-CDD updates forms the basis of the new TSS/TMT follow-on OTA planned for award in 3QFY21. The TSS/TMT follow-on OTA will continue prototype development and evaluation of minimal viable products (MVP) through technical assessments, Soldier Touch Points, Early User Test and test planning events to provide a Squad (Sq) to Company (Co) training capability, in addition to, providing Minimum Viable Capability Releases (MVCR) in support of RVCT (A/G/S) capability.</p> <p>STE Increment 1 is programmed for 4Q FY 2023 and is defined as the first fielding and acceptance of the STE-IS capability at installations identified IAW the distribution plan. Increment 1 fielded STE systems will include the following attributes: verification, validation and accreditation process complete; STE-IS capabilities in support of RVCT A/G/S and Squad Immersive Virtual Trainer (SiVT) IOC in FY 2022 and ultimately the Soldier Virtual Trainer (SVT) IOC in FY 2024; meeting Information Assurance and Risk Management Framework requirements. New Equipment Training (NET) will include the capability to support the RVCT, and the ability to provide initial sustainment via interim contractor support (ICS). Soldiers will interface with the STE-IS through the Training Management Tools, the Reconfigurable Virtual Collective Trainer (RVCT) and SiVT via the Integrated Visual Augmentation System (IVAS).</p>		





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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2022 Army</b>		<b>Date: May 2021</b>
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604121A / <i>Synthetic Training Environment Refinement &amp; Prototyping</i>	<b>Project (Number/Name)</b> CR2 / <i>STE Information Systems (TSS, TMT)</i>

Event Name	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026				
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	
STE-IS Revised A-CDD (19 Jun 20)			▲ 1																										
STE-IS Capability Development	Development/Integration/Test																												
STE-IS MVCR									▲ 2 Squad																				
STE-IS MVCR - Software Update R1													▲ 3 Company/Platoon																
STE-IS MVCR - Software Update R2																	▲ 4 Battalion/Brigade												
STE-IS Production																					Production								
STE-IS Interim Contracting Support (ICS)													Support																

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604121A / <i>Synthetic Training Environment Refinement &amp; Prototyping</i>	<b>Project (Number/Name)</b> CR2 / <i>STE Information Systems (TSS, TMT)</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
STE-IS Revised A-CDD (19 Jun 20)	3	2020	3	2020
STE-IS Capability Development	3	2019	4	2027
STE-IS MVCR	1	2022	1	2022
STE-IS MVCR - Software Update R1	1	2023	1	2023
STE-IS MVCR - Software Update R2	4	2023	4	2023
STE-IS Production	1	2024	4	2026
STE-IS Interim Contracting Support (ICS)	2	2022	4	2025

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**Exhibit R-2A, RDT&E Project Justification:** PB 2022 Army **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604121A / <i>Synthetic Training Environment Refinement &amp; Prototyping</i>	<b>Project (Number/Name)</b> CR3 / <i>STE Live</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
CR3: <i>STE Live</i>	-	-	-	20.000	-	20.000	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

**Note**

Element was previously funded from PE 604121A, Project FD6.

**A. Mission Description and Budget Item Justification**

The Synthetic Training Environment (STE) Live program develops live training systems in concert with the Cross Functional Team STE initiatives. The STE Live program converges live training with the STE, providing units the necessary training components to accelerate and sustain combined arms maneuver proficiency in support of multi-domain operations. The STE Live program focuses on the development of next generation live training architecture that leverages leading edge technologies and standards to enable the realistic exercise of unit combat weapons up to brigade level in Multi Domain Operation Environment. The challenge today is that the Army cannot train as it fights since 40% of BCT platforms weapons effects are currently not simulated by today's live training system (MILES). STE Live next generation systems will replicate the following new engagement types, improve sensory feedback, increase realism of direct fire engagement, increase realism of battle damage assessments, improve after action reviews and improve instrumentation at the Combat Training Centers and Home Stations: Indirect Fire, Counter-Defilade (M320, MK-19), Place Object (Mines), Thrown Objects (Grenades), Dropped Objects (Bombs), Guided Weapon (Missiles), Autonomous Weapon (Missiles, Smart Munitions), Direct Energy (laser), Radiant Energy (Sonic, Microwave), CBRNE Plumes and Cyber.

FY 2022 Base RDTE dollars in the amount of \$20.000 million furthers development of STE Live prototype(s) into simulation training systems to replicate the training aid weapon systems for multiple engagement scenarios (direct, indirect, & counter-defilade). These systems will replace up to six systems reaching End of Useful life and enhance Soldier capability and training value. FY 2022 funds will continue to revolutionize Soldier Simulation and Training systems to include a Synthetic Training Environment for 12 engagement types are Direct Fire, Counter-Defilade Fire, Indirect Fire, Dropped Objects, Placed Objects, Thrown Objects, Guided Weapons, Autonomous Weapons, Cyber, Directed Energy, Radiant Energy, and Plume. The 5 instrumentation enablers are Calculations, Networks, Sensors, Terrains, and Transmitters.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	FY 2020	FY 2021	FY 2022
<b>Title:</b> Engineering, Support, Test & Evaluation for STE Live	-	-	20.000
<b>Description:</b> Direct engineering development, support and test of the STE Live program through awarded OTA vehicles.			
<b>FY 2022 Plans:</b> FY 2022 Base RDTE dollars in the amount of \$20.000 million furthers development of STE Live prototype(s) into simulation training systems to replicate the training aid weapon systems for multiple engagement scenarios (direct, indirect, & counter-defilade). These systems will replace up to six systems reaching End of Useful life and enhance Soldier capability and training			

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army		<b>Date:</b> May 2021		
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604121A / <i>Synthetic Training Environment Refinement &amp; Prototyping</i>	<b>Project (Number/Name)</b> CR3 / <i>STE Live</i>		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
value. FY 2022 funds will continue to revolutionize Soldier Simulation and Training systems to include a Synthetic Training Environment for 12 engagement types are Direct Fire, Counter-Defilade Fire, Indirect Fire, Dropped Objects, Placed Objects, Thrown Objects, Guided Weapons, Autonomous Weapons, Cyber, Directed Energy, Radiant Energy, and Plume. The 5 instrumentation enablers are Calculations, Networks, Sensors, Terrains, and Transmitters.				
<b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> FY 2021 was resourced through a Congressional Add in Project FD6. FY 2022 is the first year of programmed base funding.				
<b>Accomplishments/Planned Programs Subtotals</b>		-	-	20.000
<b>C. Other Program Funding Summary (\$ in Millions)</b> N/A				
<b>Remarks</b>				
<b>D. Acquisition Strategy</b> To accelerate the live training modernization program, a STE-Live Force on Force Modular Open System Approach compliant architecture will be developed starting with direct fire, indirect fire and counter-defilade force on force engagement systems plus the five instrumentation enablers. STE-Live will leverage cutting edge technologies in areas of integrated internet of things, intelligent sensors, augmented reality and haptics to realize these capabilities. STE Live will be acquired using rapid prototyping path with objective to achieve production ready solutions within 2 to 3 years after award. STE Live OTA on track for 3QFY2021 to support IOC in 4QFY2024 and production of FOC quantities in FY 2025.				



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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2022 Army</b>			<b>Date: May 2021</b>
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604121A / <i>Synthetic Training Environ ment Refinement &amp; Prototyping</i>	<b>Project (Number/Name)</b> CR3 / STE Live	

Event Name	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
STE Live OTA 21 (DF, IDF)																												
STE Live OTA 21 (CDF)																												
STE Live OTA 22 (Mine, Grenade, Bomb)																												
STE Live OTA 23 (Missiles, Smart Munitions, IW)																												
STE Live OTA 24 (DE, RE, Plume)																												

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604121A / <i>Synthetic Training Environ ment Refinement &amp; Prototyping</i>	<b>Project (Number/Name)</b> CR3 / <i>STE Live</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
STE Live OTA 21 (DF, IDF)	3	2021	2	2022
STE Live OTA 21 (CDF)	4	2021	3	2022
STE Live OTA 22 (Mine, Grenade, Bomb)	1	2022	4	2022
STE Live OTA 23 (Missiles, Smart Munitions, IW)	2	2023	2	2024
STE Live OTA 24 (DE, RE, Plume)	2	2024	2	2025



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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army										<b>Date:</b> May 2021		
<b>Appropriation/Budget Activity</b> 2040 / 4					<b>R-1 Program Element (Number/Name)</b> PE 0604121A / <i>Synthetic Training Environment Refinement &amp; Prototyping</i>				<b>Project (Number/Name)</b> CR4 / <i>STE One World Terrain (OWT)</i>			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022 Base</b>	<b>FY 2022 OCO</b>	<b>FY 2022 Total</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>FY 2026</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
CR4: <i>STE One World Terrain (OWT)</i>	-	-	-	27.788	-	27.788	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**Note**  
This project is not a new start, efforts was previously captured under PE 604121A, Project FD6.

**A. Mission Description and Budget Item Justification**

One World Terrain (OWT) is one of three core functions of the Synthetic Training Environment-Information Systems (STE-IS). OWT provides a 3D global terrain capability and associated information services that support virtual replication of the physical Earth and complexities of the operational environment in support Multi-Domain Operations and training at the point-of-need. OWT will enable leaders, Soldiers, and units to train in complex operational environments, such as dense urban, woodland, jungle, desert, and subterranean areas before the first fight begins.

Capabilities developed by OWT automatically process raw terrain data into a well-formed format that is editable and consumable by standard commercial tools and technologies. It provides the tools to incorporate approved geospatial information updates and local terrain surveys into the OWT foundational repository and will be used by STE and tactical applications.

In FY 2021, OWT adopted the Software Acquisition Pathway employed by the STE-IS program that is tailored for software intensive systems. OWT plans to facilitate rapid and iterative delivery of its capabilities through support to STE-IS Minimal Viable Products (MVP) and Minimum Viable Capability releases (MVCR) that support Squad (Sq) through Brigade (Bde) level training until 4QFY2023.

FY 2022 Base RDTE dollars in the amount of \$27.788 million for OWT will continue prototyping automated processes for producing 3D terrain data that replicates the physical Earth and its complexities for use in STE and tactical applications. Base funding will support efforts to fully integrate OWT 3D terrain data into the TSS/TMT portion of the STE-IS. Base funding will also be used to develop Mission Command formats and Cybersecurity Testing.

The OWT requirements are codified in the STE-IS abbreviated Capabilities Development Document (A-CDD) version 2, approved 2 June 2020.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
<b>Title:</b> Engineering, Support, Test & Evaluation for OWT	-	-	27.788
<b>FY 2022 Plans:</b> Funding supports continued development and evaluation of OWT prototype processes to create the prototype terrain. OWT base funding will continue development of additional feature extraction algorithms, automated test tools, and efforts to fully integrate			

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army		<b>Date:</b> May 2021		
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604121A / <i>Synthetic Training Environment Refinement &amp; Prototyping</i>	<b>Project (Number/Name)</b> CR4 / <i>STE One World Terrain (OWT)</i>		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
<p>OWT 3D terrain data into the TSS/TMT portion of the STE-IS. Base funding will complete development of capabilities started in FY21, and begin development of prototype tactical terrain and additional revised A-CDD requirements such as automated building interiors and integration of Soldier-collected 3D hi-res terrain captures. Lastly, funding will support delivery of products for the STE-IS minimal viable capability release (MVCR), technical assessments, additional cybersecurity tests, and test planning for events leading up to the MVCR.</p> <p><b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> Increase in funding is due to new project line being established in FY22.</p>				
<b>Accomplishments/Planned Programs Subtotals</b>		-	-	27.788
<b>C. Other Program Funding Summary (\$ in Millions)</b>				
N/A				
<b>Remarks</b>				
<b>D. Acquisition Strategy</b>				
<p>The OWT requirements are codified in the STE-IS abbreviated Capabilities Development Document (A-CDD) version 2, approved 2 June 2020. OWT was one of five (5) OTAs awarded in FY 2019 in support of the STE prototype initiatives which include: STE-IS (TSS/TMT, OWT), RVCT, Live (market research only), and SVT Weapons Optimization (market research only). Prime(s) and Sub-vendors will execute the STE agreement(s) through an Agile development process with established success criteria and their DevSecOps processes. Vendors will continually include the Government and all stakeholders (Internal and external) in the Agile development process. This process will ensure all parties have transparency and early input into the modular design effort in order to support success of the product(s) being developed for the STE.</p> <p>OWT will be deployed in concert with the STE-IS as a software intensive program leveraging accelerated acquisition authorities such as the Software Acquisition Pathway. To ensure speed and agility to deliver and modernize STE, a modular open systems architecture (MOSA) will also be used to enable the Army to exploit rapid advancements in cutting-edge commercial technologies. Other acquisition elements such as testing, contracting, and technology transition will consider any and all means available to innovate and incorporate complementary support to add momentum in this approach.</p> <p>STE Increment 1 IOC is programmed for 4QFY2022 and is defined as the first fielding and acceptance of the STE-IS capability at installations identified in the A-CDD. OWT will be delivered integrated with the IOC fielded STE systems and will meet Information Assurance and Risk Management Framework requirements and will provide initial sustainment via interim contractor support (ICS). Soldiers will interface with OWT through the STE-IS Training Management Tools, which in turn will interface with the Reconfigurable Virtual Collective Trainer (RVCT) and SiVT via the Integrated Visual Augmentation System (IVAS). Confidence events and evaluations were built into the OTAs to determine the readiness and availability of technology in support of FY 2022 IOC.</p>				

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army** **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604121A / <i>Synthetic Training Environment Refinement &amp; Prototyping</i>	<b>Project (Number/Name)</b> CR4 / <i>STE One World Terrain (OWT)</i>
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Product Development (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
OWT Capability Development	Option/FFP	Maxar Technologies (formerly VRICON) : Westminster, CO	-	-		-		27.788	Dec 2021	-		27.788	Continuing	Continuing	Continuing
<b>Subtotal</b>			-	-		-		27.788		-		27.788	Continuing	Continuing	N/A

**Remarks**  
 OWT Capability Development: OWT awarded its prototype OTA on June 2019. FY22 Base RDTE funding will support the follow-on option period on the OWT OTA.  
 Note: VRICON was acquired by Maxar Technologies on 1 July 2020.

	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
<b>Project Cost Totals</b>	-	-	0.000	27.788	-	27.788	Continuing	Continuing	N/A

**Remarks**



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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604121A / <i>Synthetic Training Environment Refinement &amp; Prototyping</i>	<b>Project (Number/Name)</b> CR4 / <i>STE One World Terrain (OWT)</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
STE-IS Revised A-CDD (19 Jun 20)	3	2020	3	2020
STE-IS MVPs. MVCR	4	2021	4	2023
OWT OTA	3	2019	1	2024
OWT OTA Follow-On	2	2024	1	2029
OWT Capability Development	3	2019	1	2029
Prototype Terrain Deliveries	2	2020	2	2022
OWT Technical Assessment 2 - 4/5	2	2020	1	2021
OWT Technical Assessment 6 - 8	2	2021	1	2022
OWT Technical Assessments 11 - 13	2	2022	1	2023
OWT Technical Assessments 9 - 10	2	2023	1	2024
OWT Interim Contractor Support (ICS)	2	2023	1	2029

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army										<b>Date:</b> May 2021		
<b>Appropriation/Budget Activity</b> 2040 / 4					<b>R-1 Program Element (Number/Name)</b> PE 0604121A / <i>Synthetic Training Environment Refinement &amp; Prototyping</i>				<b>Project (Number/Name)</b> CR5 / <i>STE Reconfigurable Virtual Trainer (RVCT)</i>			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022 Base</b>	<b>FY 2022 OCO</b>	<b>FY 2022 Total</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>FY 2026</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
CR5: <i>STE Reconfigurable Virtual Trainer (RVCT)</i>	-	-	-	25.216	-	25.216	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**Note**

Element was previously funded from PE 604121A, Project FD6.

**A. Mission Description and Budget Item Justification**

The STE-IS and RVCT requirements, which are codified in abbreviated Capabilities Development Documents (A-CDD) version 2 approved 2 June 2020, directly support the Army Collective Training Environment - Initial Capabilities Document (ACTE-ICD) as the Army's cornerstone for replicating the Operational Environment (OE) during training events enabling the Army to train as it fights. Separate, but interoperable, RVCT systems are required for both air and ground collective training. The Air RVCT will represent the U.S. Army, Army National Guard, and Army Reserves fleet of rotary wing aircraft, and specified U.S. Marine Corps (USMC) aircraft. The Ground RVCT will represent ground/amphibious track and wheeled vehicles from the U.S. Army, Army National Guard, Special Operations Units and the USMC.

The Reconfigurable Virtual Collective Trainer (RVCT) is the Army's next generation Virtual Training System for conducting collective maneuver training, collective gunnery training, mission rehearsal, and pre-deployment training; that will prepare units for multi-domain operations (MDO). The RVCT includes aviation platforms (RVCT-A), ground platforms (RVCT-G), and dismounted infantry (RVCT-S) devices. The RVCT is transportable to the point of need allowing units to train anywhere in the world. The RVCT will be enabled using the Synthetic Training Environment-Information Systems (STE-IS) software, which provides a fully interactive, real time simulated battlefield. The RVCT hardware is modular in design and will accommodate the integration of new technologies and future weapon systems, will interoperate with current Constructive and Live Training Environments via the Live, Virtual, Constructive Integrating Architecture (LVC-IA); and will support interoperability with the future Next Generation Constructive (NGC) and Live Training Environments, and other STE and operational capabilities.

FY2022 Base RDTE dollars in the amount of \$25.216 million for RVCT is to finalize the technical development and demonstration of prototype designs to conduct a prototype Limited User Test (LUT) at Ft. Hood, TX that will inform a 4QFY2022 Milestone C and Low Rate Initial Production (LRIP) decision.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
<b>Title:</b> Engineering, Support, Test & Evaluation for RVCT	-	-	25.216
<b>Description:</b> Direct engineering development, support and test of the Reconfigurable Virtual Collective Trainer (RVCT) program through awarded OTA vehicles.			
<b>FY 2022 Plans:</b>			

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army		<b>Date:</b> May 2021		
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604121A / <i>Synthetic Training Environment Refinement &amp; Prototyping</i>	<b>Project (Number/Name)</b> CR5 / <i>STE Reconfigurable Virtual Trainer (RVCT)</i>		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
FY 2022 Base RDTE dollars in the amount of \$25.216 million for RVCT is to finalize the technical development and demonstration of prototype designs to establish First Unit Equipped (FUE) at Ft. Hood, followed by a LUT and Milestone C.				
<b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> Decrease of funding from FY 2021 (funded in project FD6) to FY 2022 is due to finalizing the technical development and demonstration of prototype designs to execute a Limited User Test (LUT) at Ft. Hood that will inform a 4QFY2022 Milestone C and Low Rate Initial Production (LRIP) decision.				
<b>Accomplishments/Planned Programs Subtotals</b>		-	-	25.216
<b>C. Other Program Funding Summary (\$ in Millions)</b> N/A				
<b>Remarks</b>				
<b>D. Acquisition Strategy</b> The United States Army has identified requirements for a training capability that provides a Synthetic Training Environment (STE), which includes immersive air and ground Reconfigurable Virtual Collective Trainers (RVCT), and a semi-immersive training capability for dismounted soldiers (RVCT-Soldier). The RVCT contributes significantly to the mitigation of four critical capability gaps identified in the Army's Capabilities Needs Analysis (CNA). As part of the STE Systems of Systems (SoS), the RVCT effort will deliver adaptable, low-overhead, hardware agnostic, training simulators that enable collective combined arms training in a realistic training environment that is a high-fidelity representation of current and future complex operational environments.  Separate, but interoperable, RVCT devices are required for both air and ground collective training. The RVCT Air (RVCT-A) will represent the U.S. Army, Army National Guard, and Army Reserves fleet of rotary wing aircraft. The RVCT Ground (RVCT-G) will represent ground track and wheeled vehicles from the U.S. Army, Army National Guard, and Special Operations Units. The RVCT will also include a semi-immersive training capability for dismounted soldier, the RVCT Soldier (RVCT-S).  This simplified acquisition management plan targets a Milestone C (MS C) decision and a low rate initial production (LRIP) decision for RVCT NLT 4th quarter Fiscal Year 2022 (4QFY 2022); followed by a 2nd quarter Fiscal Year 2023 Initial Operational Capability (IOC) and Full Rate Production decision. The 4QFY 2022 MS C decision date is driven by several contributing factors: the aging legacy Training Aids Devices Simulators, and Simulations (TADSS), the widening of their respective concurrency gaps; and advanced technology developments in the field of Modeling & Simulation (M&S) that now allow the US Army to realize a level of training realism that is not possible with the current generation of legacy TADSS.  RVCT is projected to be an Acquisition Category II program that will implement the Major Capability Acquisition (MCA) pathway governed by DoDi 5000.85, "Major Capabilities Acquisition", dtd 6 August 2020. As an ACAT II program the Milestone Decision Authority (MDA) will rest with the Program Executive Officer for Simulation, Training and Instrumentation (PEO STRI).				

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604121A / <i>Synthetic Training Environment Refinement &amp; Prototyping</i>	<b>Project (Number/Name)</b> CR5 / <i>STE Reconfigurable Virtual Trainer (RVCT)</i>
<p>The Phase 1 RVCT First Article (FA) prototyping phase is an iterative discovery and development process that entails close collaboration between Soldier stakeholders, customers, industry, and the development engineering community. The RVCT FA prototyping phase provides users with multiple feedback points, using pre-planned Synthetic Training Environment-Information System (STE-IS) Minimum Viable Product (MVP) software capability drops to facilitate Soldier Centric Design principles. Throughout the FA prototyping phase the RVCT PMO will prioritize requirements as a trade-off for delivery, affordability, and risk reduction.</p> <p>The RVCT Phase 2 will produce prototype RVCT A/G systems, for delivery to Ft Hood, TX; including New Equipment Training (NET), establishment of an initial RVCT Product Support capability and infrastructure, and initiation of Interim Contractor logistics (ICS).</p> <p>A 4QFY 2022 Limited User Test (LUT) of the RVCT prototypes will be conducted at Ft Hood, TX. The LUT will determine whether the RVCT systems are operationally effective, suitable, survivable, and safe for intended use to support a 4QFY 2022 RVCT Milestone C (MS-C) and LRIP decision. The RVCT LUT will be conducted on production representative RVCT hardware running the STE-IS Minimum Viable Capability Release (MVCR) Company level software capability.</p> <p>At the conclusion of the RVCT LUT the Government anticipates a RVCT MS-C Acquisition Decision Memorandum (ADM) approving a follow-on production effort. The follow-on production effort will include a 4QFY 2022 LRIP to establish the initial RVCT production base. A combined STE-IS &amp; RVCT IOT&amp;E will be conducted 3QFY 2023. The IOT&amp;E will inform a 4QFY 2023 RVCT IOC and Full Rate Production decision.</p>		





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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2022 Army</b>			<b>Date: May 2021</b>
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604121A / <i>Synthetic Training Environment Refinement &amp; Prototyping</i>	<b>Project (Number/Name)</b> CR5 / <i>STE Reconfigurable Virtual Trainer (RVCT)</i>	

Event Name	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
RVCT PH2, Complete Prototypes																												
RVCT FUE																												
RVCT MDD																												
RVCT AROC																												
RVCT NET																												
RVCT LUT																												
RVCT MS-C & LRIP																												
RVCT IOT																												
RVCT IOC																												
RVCT FRP																												

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604121A / <i>Synthetic Training Environment Refinement &amp; Prototyping</i>	<b>Project (Number/Name)</b> CR5 / <i>STE Reconfigurable Virtual Trainer (RVCT)</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
RVCT PH2, Complete Prototypes	3	2021	3	2022
RVCT FUE	3	2022	3	2022
RVCT MDD	3	2022	3	2022
RVCT AROC	3	2022	3	2022
RVCT NET	4	2022	4	2022
RVCT LUT	4	2022	4	2022
RVCT MS-C & LRIP	4	2022	4	2022
RVCT IOT	3	2023	3	2023
RVCT IOC	4	2023	4	2023
RVCT FRP	4	2023	4	2028

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army										<b>Date:</b> May 2021		
<b>Appropriation/Budget Activity</b> 2040 / 4					<b>R-1 Program Element (Number/Name)</b> PE 0604121A / <i>Synthetic Training Environment Refinement &amp; Prototyping</i>				<b>Project (Number/Name)</b> CR6 / <i>STE Squad Immersive Virtual Trainer (SiVT)</i>			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022 Base</b>	<b>FY 2022 OCO</b>	<b>FY 2022 Total</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>FY 2026</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
CR6: <i>STE Squad Immersive Virtual Trainer (SiVT)</i>	-	-	-	5.000	-	5.000	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**Note**  
Project is not a new start. Funding for SiVT efforts is captured under PE 0604121A, Project SV1.

**A. Mission Description and Budget Item Justification**

Squad Immersive Virtual Trainer (SiVT) is the immersive training capability delivered as part of the Integrated Visual Augmentation System (IVAS) for the close combat Squads that enables IVAS to be a fight, rehearse, and training platform. SiVT provides a single platform for Soldiers/Marines to Fight, Rehearse, and Train with day and night providing increased lethality, mobility, and situational awareness necessary to achieve overmatch against our current and future adversaries. SiVT provide the Close Combat Force a mechanism to modernize in a comprehensive, deliberate pathway; A readiness tool for Squad Lethality and Human Performance assessment; Transformative ability to access and exploit data across domains and levels of command and a Synthetic Training Environment (STE) tool enabling on-demand squad training.

FY 2022 Base RDTE dollars in the amount of \$5.000 million will finalize the prototype development and demonstration of production representative articles to support First Unit Issue (FUI).

**B. Accomplishments/Planned Programs (\$ in Millions)**

	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
<b>Title:</b> Engineering, Support, Test & Evaluation for SiVT	-	-	5.000
<b>FY 2022 Plans:</b> Funding will finalize the prototype development and demonstration of production representative articles to support First Unit Issue (FUI).			
<b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> Increase in funding is due to new project line being established in FY 2022.			
<b>Accomplishments/Planned Programs Subtotals</b>	-	-	5.000

**C. Other Program Funding Summary (\$ in Millions)**

<b>Line Item</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022 Base</b>	<b>FY 2022 OCO</b>	<b>FY 2022 Total</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>FY 2026</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
• NA2020: <i>Synthetic Training Environment (STE)</i>	14.449	13.063	-	-	-	-	-	-	-	-	-

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604121A / <i>Synthetic Training Environment Refinement &amp; Prototyping</i>	<b>Project (Number/Name)</b> CR6 / <i>STE Squad Immersive Virtual Trainer (SiVT)</i>

**C. Other Program Funding Summary (\$ in Millions)**

<u>Line Item</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022</u>			<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>FY 2026</u>	<u>Cost To</u>	
			<u>Base</u>	<u>OCO</u>	<u>Total</u>					<u>Complete</u>	<u>Total Cost</u>
• NA2211: <i>STE SiVT (IVAS TRAINER)</i>	-	-	69.266	-	69.266	-	-	-	-	-	-

**Remarks**

Base Procurement dollars for Squad immersive Virtual Trainer (SiVT) will conduct the procurement of hardware associated with the SiVT Kits, in addition to, providing New Equipment Training, Post Deployment Software Support, and associated fielding support.

**D. Acquisition Strategy**

Integrated Visual Augmentation System (IVAS) prototype OTA was awarded November 2018 to provide Soldiers the Fight, Rehearse, and Train capability to the close combat Soldiers. Squad Immersive Virtual Trainer (SiVT) provides the training capability for home station training. The SiVT capabilities developed during the prototype effort was assessed through Soldier Touch Points and feedback in support of the follow on production efforts. Currently, the Synthetic Training Environment, Cross Functional Team (STE CFT) and the Program Executive Office for Simulation, Training and Instrumentation (PEO STRI) are working closely with Soldier Lethality CFT and PEO Soldier to leverage their production OTA contract for an anticipated 3rd QTR FY 2021 award in order to meet First Unit Issued in 1st Quarter FY 2022 and an incremental approach to First Unit Equipped (FUE) in FY 2023. The Production and Fielding OTA will be a five-year effort fielding to all active and reserve components close combat units.



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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2022 Army</b>		<b>Date: May 2021</b>
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604121A / <i>Synthetic Training Environment Refinement &amp; Prototyping</i>	<b>Project (Number/Name)</b> CR6 / <i>STE Squad Immersive Virtual Trainer (SiVT)</i>

Event Name	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
SiVT Proptotype Development	████████████████																											
First Unit Issued									▲ 1																			
IOC												▲ 2																
SiVT Development/Concurrency									██																			
SiVT Production									██																			

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604121A / <i>Synthetic Training Environment Refinement &amp; Prototyping</i>	<b>Project (Number/Name)</b> CR6 / <i>STE Squad Immersive Virtual Trainer (SiVT)</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
SiVT Proptotype Development	1	2019	4	2021
First Unit Issued	1	2022	1	2022
IOC	1	2023	1	2023
SiVT Development/Concurrency	4	2021	4	2025
SiVT Production	4	2021	4	2025



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**Exhibit R-2A, RDT&E Project Justification:** PB 2022 Army **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4					<b>R-1 Program Element (Number/Name)</b> PE 0604121A / Synthetic Training Environment Refinement & Prototyping				<b>Project (Number/Name)</b> CR7 / STE Soldier Virtual Trainer (SVT)			
COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
CR7: STE Soldier Virtual Trainer (SVT)	-	-	-	11.288	-	11.288	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**Note**

This is a new start in FY 2022.

**A. Mission Description and Budget Item Justification**

The Soldier Virtual Trainer (SVT) is enabled by the Synthetic Training Environment (STE) and is a virtual immersive trainer that combines and integrates several individual Soldier training capabilities: Weapon Skills Development (WSD), Joint Fires Training (JFT), and Use of Force (UoF). (1) WSD provides immersive capability to meet individual/crew weapons training in support of Army integrated weapon training strategies. (2) JFT provides certification and qualification of Joint Fires Observers (JFO). This includes the training of types II and III close air support according to the JFO Memorandums of Agreement. (3) UoF training enables Soldiers to replicate current Non-Lethal (NL) devices, munitions that demand the user to determine the appropriate level of force, select the correct device, and comply with doctrine, legal policy, and guidance for NL device employment.

FY 2022 Base RDTE dollars in the amount of \$11.288 million for SVT will be used for the technical development and demonstration of prototype designs for the Weapons Skills Development (WSD), Joint Fires Training (JFT) and Use of Force (UoF) capabilities. These prototype designs will inform; requirements, technology readiness level maturity, and level of effort to integrate with the common synthetic environment. SVT's acquisition strategy implementation and award will reduce impact of replacing currently fielded sustained Program of Records (Engagement Skills Trainer II (EST II) and Call for Fire Trainer III (CFFT III)). EST and CFFT PoRs are currently in sustainment awaiting to be replaced by SVT.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	FY 2020	FY 2021	FY 2022
<b>Title:</b> Engineering, Support, Test & Evaluation for SVT	-	-	11.288
<b>Description:</b> Direct engineering development, support and test of the Soldier Virtual Trainer (SVT) program through awarded OTA vehicles.			
<b>FY 2022 Plans:</b> FY 2022 Base RDTE dollars in the amount of \$11.288 million will be used for the technical development and demonstration of prototype designs for the Weapons Skills Development (WSD), Joint Fires Training (JFT) and Use of Force (UoF) capabilities. The prototype solution will assess industry and academia's technical readiness.			
<b>FY 2021 to FY 2022 Increase/Decrease Statement:</b>			

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604121A / <i>Synthetic Training Environment Refinement &amp; Prototyping</i>	<b>Project (Number/Name)</b> CR7 / <i>STE Soldier Virtual Trainer (SVT)</i>

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
This is a new start in FY2022.			
<b>Accomplishments/Planned Programs Subtotals</b>	-	-	11.288

**C. Other Program Funding Summary (\$ in Millions)**

N/A

**Remarks**

**D. Acquisition Strategy**

The SVT uses the Synthetic Training Environment (STE) modular open systems architecture via virtual interface and hardware standards. SVT optimizes training delivery through the employment of a combination of Operational Environment (OE) mixed reality visualization and Natural User Interface (NUI) technologies to maximize efficiencies for the integration of system capabilities. The SVT system design combines and integrates several individual Soldier and squad training capabilities, Weapon Skill Development (WSD), Joint Fires Training (JFT), and Use of Force (UoF), into a single capability that can be conducted simultaneously or individually and enable physical movement/exertion related to the execution of a Soldier individual and squad collective training tasks. The system is required to be person transportable and deployable worldwide. It delivers training at the Point of Need (PoN) supporting Army-wide formations such as artillery, Military Police, and units for weapons skills development.

Status: Acquisition planning in progress for an OTA award in 2QFY22. User Assessments (UA) to be conducted during the development phase. SVT will utilize Soldier feedback within the UAs to ensure Warfighter feedback is incorporated and facilitate acceptance.

A Soldier/Squad Virtual Trainer OTA was awarded in FY 2019 in support of STE prototype initiatives and SVT: S/SVT Weapons Optimization (market research only). Confidence events and evaluations were built into the OTA in determining the readiness and availability of technology in support of FY 2024 IOC.

Future phases currently under market research will provide Soldier Virtual Trainer (SVT) capabilities.

The SVT OTA's Prime(s) and Sub-vendors will execute the STE agreement(s) through an Agile development process with established success criteria and their DevSecOps processes and develop prototype to prove out the three SVT capabilities: WSD, UoF, and JFT. SVT Vendors will continually include the Government and all stakeholders (Internal and external) in the SVT Hardware prototype development and the STE-IS Agile development integration process. This process will ensure all parties have transparency and early input into the modular design effort in order to support success of the product(s) being developed for the SVT and interacting with the STE-IS. Other acquisition elements such as testing, contracting, and technology transition will consider any and all means available to innovate and incorporate complementary support to add momentum in this approach.

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<b>Exhibit R-3, RDT&amp;E Project Cost Analysis: PB 2022 Army</b>												<b>Date: May 2021</b>			
<b>Appropriation/Budget Activity</b> 2040 / 4				<b>R-1 Program Element (Number/Name)</b> PE 0604121A / Synthetic Training Environ ment Refinement & Prototyping					<b>Project (Number/Name)</b> CR7 / STE Soldier Virtual Trainer (SVT)						
<b>Product Development (\$ in Millions)</b>				<b>FY 2020</b>		<b>FY 2021</b>		<b>FY 2022 Base</b>		<b>FY 2022 OCO</b>		<b>FY 2022 Total</b>			
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
Soldier Virtual Trainer (SVT)	C/FFP	TBD : Orlando, FL	-	-		-		11.288	Mar 2022	-		11.288	Continuing	Continuing	Continuing
<b>Subtotal</b>			-	-		-		11.288		-		11.288	Continuing	Continuing	N/A
			<b>Prior Years</b>	<b>FY 2020</b>		<b>FY 2021</b>		<b>FY 2022 Base</b>		<b>FY 2022 OCO</b>		<b>FY 2022 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Project Cost Totals</b>			-	-		0.000		11.288		-		11.288	Continuing	Continuing	N/A
<b>Remarks</b>															

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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2022 Army</b>		<b>Date: May 2021</b>
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604121A / <i>Synthetic Training Environment Refinement &amp; Prototyping</i>	<b>Project (Number/Name)</b> CR7 / <i>STE Soldier Virtual Trainer (SVT)</i>

Event Name	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
SVT OTA Award									1 Contract Award																			
SVT Development																												
SVT IOC									2 IOC																			
SVT Production																												

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604121A / <i>Synthetic Training Environment Refinement &amp; Prototyping</i>	<b>Project (Number/Name)</b> CR7 / <i>STE Soldier Virtual Trainer (SVT)</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
SVT OTA Award	2	2022	2	2022
SVT Development	3	2022	1	2025
SVT IOC	4	2024	4	2024
SVT Production	1	2025	4	2028

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army										<b>Date:</b> May 2021		
<b>Appropriation/Budget Activity</b> 2040 / 4					<b>R-1 Program Element (Number/Name)</b> PE 0604121A / <i>Synthetic Training Environment Refinement &amp; Prototyping</i>				<b>Project (Number/Name)</b> FD6 / <i>Synthetic Training Environment Refine &amp; Prototype</i>			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022 Base</b>	<b>FY 2022 OCO</b>	<b>FY 2022 Total</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>FY 2026</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
FD6: <i>Synthetic Training Environment Refine &amp; Prototype</i>	-	27.975	105.354	-	-	-	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**Note**

In FY 2022, all requirements from PE 0604121A, Project FD6 - Synthetic Training Environment Refine & Prototype were realigned to Projects CR2 (STE Information Systems [TSS, TMT]), CR3 (STE Live), CR4 (STE One World Terrain [OWT]), CR5 (STE Reconfigurable Virtual Trainer [RVCT]), and CR7 (STE Soldier Virtual Trainer [SVT]).

**A. Mission Description and Budget Item Justification**

The STE will be a single, yet comprehensive interconnected training system that provides a Synthetic Training Environment, in which air and ground units from crew/section through Army Service Component Command (ASCC) conduct realistic multi-echelon / multi-domain combined arms maneuver, air ground integration, and mission command training. All of these components are interconnected and based off of a standard, modular and open system architecture model.

The STE-Information System (STE-IS) consists of three core functions: Training Management Tool (TMT), Training Simulation Software (TSS), and One World Terrain (OWT). The Training Management Tool (TMT) is the capability that enables units to quickly plan collective training events, prepare training events; execute and monitor events, and assess event results and readiness. The Training Simulation Software (TSS), the core STE simulation engine, provides the physical and behavior models necessary to replicate the operational environment to enable collective training from Soldier/Squad through ASCC. The STE-IS is a dynamic, digital representation of the Operational Environment (OE) and the military capabilities in the scenario. The TSS provides entity, aggregate, and common services, as well as adjudicates STE-IS interactions at the entity level (e.g., Computer-Generated Forces (CGF), and synthetic equipment). One World Terrain (OWT) is a 3-Dimensional global terrain capability and associated information services that supports the virtual replication of the physical Earth and complexities of the Operational Environment in support of training in the STE. In FY21, the STE-IS adopted the execution of the Software Acquisition Pathway, tailored for software intensive systems. The STE-IS plans to facilitate rapid and iterative delivery of the TSS/TMT and OWT capabilities through Minimal Viable Products (MVP) and Minimum Viable Capability releases (MVCR) to support Squad (Sq) to Brigade (Bde) level training through 4QFY2023.

The STE-IS and RVCT requirements, which are codified in abbreviated Capabilities Development Documents (A-CDD) version 2 approved 2 June 2020, directly support the Army Collective Training Environment - Initial Capabilities Document (ACTE-ICD) as the Army's cornerstone for replicating the Operational Environment (OE) during training events enabling the Army to train as it fights. Separate, but interoperable, RVCT systems are required for both air and ground collective training. The Air RVCT will represent the U.S. Army, Army National Guard, and Army Reserves fleet of rotary wing aircraft, and specified U.S. Marine Corps (USMC) aircraft. The Ground RVCT will represent ground/amphibious track and wheeled vehicles from the U.S. Army, Army National Guard, Special Operations Units and the USMC.

The Reconfigurable Virtual Collective Trainer (RVCT) is the Army's next generation Virtual Training System for conducting collective maneuver training, collective gunnery training, mission rehearsal, and pre-deployment training; that will prepare units for multi-domain operations (MDO). The RVCT includes aviation platforms

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army	<b>Date:</b> May 2021
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<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604121A / <i>Synthetic Training Environment Refinement &amp; Prototyping</i>	<b>Project (Number/Name)</b> FD6 / <i>Synthetic Training Environment Refine &amp; Prototype</i>
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(RVCT-A), ground platforms (RVCT-G), and dismounted infantry (RVCT-S) devices. The RVCT is transportable to the point of need allowing units to train anywhere in the world. The RVCT will be enabled using the Synthetic Training Environment-Information Systems (STE-IS) software, which provides a fully interactive, real time simulated battlefield. The RVCT hardware is modular in design and will accommodate the integration of new technologies and future weapon systems, and will interoperate with the current Constructive and Live Training Environments.

The Soldier Virtual Trainer (SVT) is enabled by the Synthetic Training Environment (STE) and is a virtual immersive trainer that combines and integrates several individual Soldier training capabilities: Weapon Skills Development (WSD), Joint Fires Training (JFT), and Use of Force (UoF). (1) WSD provides immersive capability to meet individual/crew weapons training in support of Army integrated weapon training strategies. (2) JFT provides certification and qualification of Joint Fires Observers (JFO). This includes the training of types II and III close air support according to the JFO Memorandums of Agreement. (3) UoF training enables Soldiers to replicate current Non-Lethal (NL) devices, munitions that demand the user to determine the appropriate level of force, select the correct device, and comply with doctrine, legal policy, and guidance for NL device employment. Weapon Skills Development (WSD), Joint Fires Training (JFT), and Use of Force (UoF), into a single capability that can be used simultaneously or individually.

The Synthetic Training Environment (STE) Live program develops live training systems in concert with the Cross Functional Team STE initiatives. The STE Live program converges live training with the STE, providing units the necessary training components to accelerate and sustain combined arms maneuver proficiency in support of multi-domain operations. The STE Live program focuses on the development of the 12 engagement types and 5 instrumentation enablers ("12+5"). The 12 engagement types are Direct Fire, Counter-Defilade Fire, Indirect Fire, Dropped Objects, Placed Objects, Thrown Objects, Guided Weapons, Autonomous Weapons, Cyber, Directed Energy, Radiant Energy, and Plume. The 5 instrumentation enablers are Calculations, Networks, Sensors, Terrains, and Transmitters.

In FY 2022, all requirements from Project FD6 - Synthetic Training Environment Refine & Prototype were realigned to Projects CR2 (STE Information Systems [TSS, TMT]), CR3 (STE Live), CR4 (STE One World Terrain [OWT]), CR5 (STE Reconfigurable Virtual Trainer [RVCT]), and CR7 (STE Soldier Virtual Trainer [SVT]).

**B. Accomplishments/Planned Programs (\$ in Millions)**

	FY 2020	FY 2021	FY 2022
<p><b>Title:</b> Engineering, Support, Test &amp; Evaluation for STE-IS</p> <p><b>Description:</b> Direct engineering development, support and test of the TSS/TMT and OWT capability through awarded OTA vehicles.</p> <p><b>FY 2021 Plans:</b> Funding supports the STE-IS continued development and evaluation of the TSS/TMT minimal viable products (MVP) through technical assessments, Soldier Touch Points, Early User Test and test planning events to provide Squad (Sq) training capability. Base funding will also implement the DEVSECOPS process and software production pipeline to support STE-IS capability releases by echelons. Additionally, base funding will commence the development and integration of Avionics Software Emulation (AvSE) with TSS/TMT software baseline to ensure that the RVCT Air capability is concurrent with Aviation platform systems. Lastly, STE-IS base funding will focus on developing additional feature extraction algorithms for the OWT 3D Global Terrain</p>	-	62.120	-

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army		<b>Date:</b> May 2021		
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604121A / <i>Synthetic Training Environment Refinement &amp; Prototyping</i>	<b>Project (Number/Name)</b> FD6 / <i>Synthetic Training Environment Refine &amp; Prototype</i>		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
capability, developing automated test tools, and supporting efforts to fully integrate OWT 3D terrain data into the TSS/TMT portion of the STE-IS.  <b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> Decrease of funding from FY 2021 to FY 2022 is due to moving effort to PE 0604121A, Project CR2 (STE Information Systems [TSS, TMT] and Project CR4 (STE One World Terrain [OWT])).				
<b>Title:</b> Engineering, Support, Test & Evaluation for RVCT  <b>Description:</b> Direct engineering development, support and test of the Reconfigurable Virtual Collective Trainer (RVCT) program through awarded OTA vehicles.  <b>FY 2021 Plans:</b> FY 2021 Base RDTE dollars in the amount of \$32.834 million is focused on the continued design and development of prototype RVCT platforms and devices. These prototype will inform requirements, technology readiness level maturity, and level of effort to integrate with the STE-IS common synthetic environment.  <b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> Decrease of funding from FY 2021 to FY 2022 is due to moving effort to PE 0604121A, Project CR5 (STE RVCT).		27.909	32.834	-
<b>Title:</b> Program Management  <b>Description:</b> Program management, engineering and technical oversight, contract support, and travel for the development of the program.		0.066	-	-
<b>Accomplishments/Planned Programs Subtotals</b>		27.975	94.954	-
		<b>FY 2020</b>	<b>FY 2021</b>	
<b>Congressional Add:</b> Congressional Add for STE-LIVE - (Army requested transfer from WTCV line 5)  <b>FY 2021 Plans:</b> FY 2021 Base RDTE dollars in the amount of \$10.400 million heavily focuses on the development and prototype solutions of the STE Live Force of Force Direct/Indirect/Counter-defilade capabilities. Funds support the continued development and assessment of technical capabilities through technical assessments and user assessments, and test planning events. FY 2021 will complete the development prototype activities on the training solutions through Other Transactions agreement. The funds will be used to develop mature and more capable direct fire prototype solution to replace some of the systems reaching end of		-	10.400	



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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604121A / <i>Synthetic Training Environment Refinement &amp; Prototyping</i>	<b>Project (Number/Name)</b> FD6 / <i>Synthetic Training Environment Refine &amp; Prototype</i>

	<b>FY 2020</b>	<b>FY 2021</b>
life and accelerate the maturation of key technologies needed to introduce indirect fire and counter defilade force on force engagement enablers into the live training environment.		
<b>Congressional Adds Subtotals</b>	-	10.400

**C. Other Program Funding Summary (\$ in Millions)**

<u>Line Item</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022</u> <u>Base</u>	<u>FY 2022</u> <u>OCO</u>	<u>FY 2022</u> <u>Total</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>FY 2026</u>	<u>Cost To Complete</u>	<u>Total Cost</u>
• NA2000: <i>Synthetic Training Environment (STE)</i>	14.449	13.063	122.104	-	122.104	-	-	-	-	-	-

**Remarks**

**D. Acquisition Strategy**

STE will be developed and acquired as an incrementally deployed software intensive program leveraging accelerated acquisition authorities when appropriate. To ensure speed and agility to deliver and modernize STE, a modular open systems architecture (MOSA) will be developed enabling the Army to exploit rapid advancements in cutting-edge commercial visualization and immersion technologies. STE will employ a combined approach to enable agile development of the STE-IS with parallel incremental development of the RVCT A/G, SiVT and SVT. This model facilitates leveraging commercial and Government technology development that are necessary for future Live and Constructive centered increments. Other acquisition elements such as testing, contracting, and technology transition will consider any and all means available to innovate and incorporate complementary support to add momentum in this approach.

STE Increment 1 IOC is programmed for 4Q FY 2022. IOC is defined as the first fielding and acceptance of the STE-IS capability at installations identified IAW the distribution plan. IOC fielded STE systems will include the following attributes: verification, validation and accreditation process complete; STE-IS capabilities in support of RVCT A/G and Squad Immersive Virtual Trainer (SiVT) IOC in FY 2022 and ultimately the Soldier Virtual Trainer (SVT) IOC in FY 2024; meeting Information Assurance and Risk Management Framework requirements. New Equipment Training (NET) will include the capability to support the RVCT, and the ability to provide initial sustainment via interim contractor support (ICS). Soldiers will interface with the STE-IS through the Training Management Tools, the Reconfigurable Virtual Collective Trainer (RVCT) and SiVT via the Integrated Visual Augmentation System (IVAS).

Future phases currently under market research will provide Soldier Virtual Trainer (SVT) capabilities and integrate Live training components as well as Next Generation Constructive (NGC).

Five (5) OTAs were awarded in FY 2019 in support of STE prototype initiatives: STE-IS (TSS/TMT, OWT), RVCT, Live (market research only), and SVT Weapons Optimization (market research only). Confidence events and evaluations were built into the OTAs to determine the readiness and availability of technology in support of FY 2022 IOC. Prime(s) and Sub-vendors will execute the STE agreement(s) through an Agile development process with established success criteria and their

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604121A / <i>Synthetic Training Environment Refinement &amp; Prototyping</i>	<b>Project (Number/Name)</b> FD6 / <i>Synthetic Training Environment Refine &amp; Prototype</i>
<p>DevSecOps processes. Vendors will continually include the Government and all stakeholders (Internal and external) in the Agile development process. This process will ensure all parties have transparency and early input into the modular design effort in order to support success of the product(s) being developed for the STE.</p> <p>The initial TSS/TMT OTA allowed the Government to fully understand and decompose the requirements, establish/describe interfaces between TSS/TMT and RVCT, Avionics Software Emulation (AvSE) and OWT capabilities, and exposed the Government to the readiness of additional technologies that will enable the delivery of an integrated STE. These lesson learned, along with the incorporating the revised A-CDD updates forms the basis of the new TSS/TMT follow-on competition planned for award in 3QFY21.</p>		

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army												Date: May 2021			
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)							
2040 / 4				PE 0604121A / Synthetic Training Environment Refinement & Prototyping				FD6 / Synthetic Training Environment Refine & Prototype							
Management Services (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Management Services	Various	Various : Orlando, FL	6.996	0.066		-		-		-		-	0.000	7.062	12.454
<b>Subtotal</b>			6.996	0.066		-		-		-		-	0.000	7.062	N/A
Product Development (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Product Development STE-IS/ TSS/TMT	C/FP	MAK Technologies : Cambridge, MA	35.750	-		5.618	Oct 2020	-		-		-	0.000	41.368	41.368
Product Development STE-IS/ TSS/TMT Follow-on	C/TBD	ACC-Orlando : Orlando, FL	-	-		13.300	May 2021	-		-		-	Continuing	Continuing	Continuing
STE-IS AvSE Development/Integration	Various	PEO STRI : Orlando, FL	-	-		7.361	Mar 2021	-		-		-	Continuing	Continuing	Continuing
Product Development STE-IS/One World Terrain	C/FP	Maxar Technologies (formerly VRICON) : Westminster, CO	25.582	-		35.841	Dec 2020	-		-		-	Continuing	Continuing	Continuing
Product Development Reconfigurable Virtual Collective Trainers	C/FP	Cole Engineering Services Inc : Orlando, FL	25.629	27.909	Dec 2019	32.834	Feb 2021	-		-		-	Continuing	Continuing	Continuing
Product Development STE-LIVE	C/TBD	TBD : Orlando, FL	0.100	-		-		-		-		-	Continuing	Continuing	Continuing
Congressional Add - STE-LIVE	C/TBD	TBD : Orlando, FL	-	-		10.400	Jun 2021	-		-		-	0.000	10.400	10.400
Product Development Soldier/Squad Virtual Trainer (IVAS)	C/FP	Microsoft : Redmond, WA	39.228	-		-		-		-		-	0.000	39.228	34.792
Small Business Innovation/ Tech Insertion	Various	Various : Orlando, FL	3.270	-		-		-		-		-	0.000	3.270	3.270
<b>Subtotal</b>			129.559	27.909		105.354		-		-		-	Continuing	Continuing	N/A



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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2022 Army</b>		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604121A / Synthetic Training Environment Refinement & Prototyping	<b>Project (Number/Name)</b> FD6 / Synthetic Training Environment Refine & Prototype

Event Name	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
A-CDD	▲ 1 CDD																											
Other Transaction Authority 1																												
OTA Tech Insertion	OTA 1																											
Production																												
STE-IS Capability Development	Tech Insertion								Production																			
STE-IS MVCR																												
STE-IS MVCR - Software Update R1	Development/Integration/Test								▲ 2 Squad				▲ 3 Company/Platoon															
STE-IS MVCR - Software Update R2																												
STE-IS Production													▲ 4 Battalion/Brigade				Production											
STE-IS Interim Contracting Support (ICS)																												
									Support																			

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604121A / <i>Synthetic Training Environment Refinement &amp; Prototyping</i>	<b>Project (Number/Name)</b> FD6 / <i>Synthetic Training Environment Refine &amp; Prototype</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
A-CDD	3	2020	3	2020
FOC	4	2027	4	2027
Other Transaction Authority 1	3	2019	2	2026
OTA Tech Insertion	1	2020	4	2026
Production	4	2022	4	2027
STE-IS Capability Development	3	2019	4	2027
STE-IS MVCR	1	2022	1	2022
STE-IS MVCR - Software Update R1	1	2023	1	2023
STE-IS MVCR - Software Update R2	4	2023	4	2023
STE-IS Production	1	2024	4	2026
STE-IS Interim Contracting Support (ICS)	2	2022	4	2025

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**Exhibit R-2A, RDT&E Project Justification:** PB 2022 Army **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4					<b>R-1 Program Element (Number/Name)</b> PE 0604121A / <i>Synthetic Training Environment Refinement &amp; Prototyping</i>				<b>Project (Number/Name)</b> SV1 / <i>Soldier/Squad Virtual Trainer</i>			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022 Base</b>	<b>FY 2022 OCO</b>	<b>FY 2022 Total</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>FY 2026</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
SV1: <i>Soldier/Squad Virtual Trainer</i>	-	71.382	6.739	-	-	-	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**Note**

In FY 2022, all requirements from Project SV1 - Soldier/Squad Virtual Trainer were realigned to Projects CR4 (STE One World Terrain [OWT]) and CR6 (STE Squad Immersive Virtual Trainer [SiVT]).

**A. Mission Description and Budget Item Justification**

The United States Army identified a near term requirement for a Soldier and Squad Virtual Trainer (S/SVT) to address the small unit collective training gaps, and to merge the Engagement Skills Trainer (EST) II, Call for Fire Trainer (CFFT) III, and the current non program of record Use-of-Force trainer into a single program starting in FY 2021. The S/SVT is the next generation trainer that enables Soldiers/Marines to conduct squad, weapons, and joint fires training, as well as rehearse lethal and non-lethal use-of-force interactions prior to live events to measure the unit's Mission Essential Task List proficiency, which will then provide a unit's Standards for Training Proficiency.

S/SVT is comprised of Squad Immersive Trainer (SiVT); also commonly referred to as both the IVAS and the Soldier Virtual Trainer (SVT) capabilities. The first increment of the S/SVT, which is the Squad immersive Virtual Trainer (SiVT) capability, integrates into the Heads Up Display (HUD) 3.0 as part of the Integrated Visual Augmentation System (IVAS). Increments 2 and 3 of S/SVT combines individual Soldier and squad training into a single capability and includes STE Squad Capability (SSC), Weapon Skill Development (WSD), Joint Fires Training (JFT), and Use of Force (UoF), which integrate the NEXTGEN Marksmanship and the NEXTGEN Call For Fire Artillery Virtual Training capability into the STE baseline.

The second phase; the SVT system design combines and integrates several individual Soldier and squad training capabilities, Weapon Skills Development (WSD), Joint Fires Training (JFT), and Use of Force (UoF).

SVT is dependent and interconnected through the STE-IS software baseline . The STE-IS core cross-cutting capabilities will deliver software, application(s) and services that optimize cloud-enabled capability simulation processing to Reconfigurable Virtual Collective Trainer (RVCT), Solider Virtual Trainer (SVT), and the future Next Generation Constructive (NGC) capability to include Force-on-Force (FoF) and Force-on-Target (FoT) Live training instrumentation .

FY 2021 funding of \$6.739 million reinitiates the market research and prototype solutions for the SVT solution assessing industry and academia's technical readiness and availability around Weapons Skills Development, Joint Fires and Use of Force.

In FY 2022, all requirements from Project SV1 - Soldier/Squad Virtual Trainer were realigned to Projects CR4 (STE One World Terrain [OWT]) and CR6 (STE Squad Immersive Virtual Trainer [SiVT]).

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604121A / <i>Synthetic Training Environment Refinement &amp; Prototyping</i>	<b>Project (Number/Name)</b> SV1 / <i>Soldier/Squad Virtual Trainer</i>

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
<b>Title:</b> Engineering, Support, Test & Evaluation <b>Description:</b> Market Research and Prototype Assessment of Soldier Virtual Trainer capabilities.  <b>FY 2021 Plans:</b> FY 2021 funding of \$6.739 million reinitiates the market research and prototype solutions for the SVT solution assessing industry and academia's technical readiness and availability around Weapons Sill Development, Joint Fires and Use of Force. Resources will support a new OTA prototype award to include technical assessments and soldier user assessments of technical availability within industry helping to refine the overarching requirement for the SVT solution.  <b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> In FY 2022, all requirements from Project SV1 ? Soldier/Squad Virtual Trainer were shifted to Project FD6 to consolidate all STE requirements into one project.	71.382	6.739	-
<b>Accomplishments/Planned Programs Subtotals</b>	71.382	6.739	-

<b>C. Other Program Funding Summary (\$ in Millions)</b>											
<u>Line Item</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022</u> <u>Base</u>	<u>FY 2022</u> <u>OCO</u>	<u>FY 2022</u> <u>Total</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>FY 2026</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• NA2000: <i>Synthetic Training Environment (STE)</i>	14.449	13.063	122.104	-	122.104	-	-	-	-	-	-

**Remarks**

**D. Acquisition Strategy**  
 The S/SVT uses the Synthetic Training Environment (STE) modular open systems architecture via virtual interface and hardware standards. S/SVT optimizes training delivery through the employment of a combination of Operational Environment (OE) mixed reality visualization and Natural User Interface (NUI) technologies to maximize efficiencies for the integration of system capabilities. The S/SVT system design combines and integrates several individual Soldier and squad training capabilities, Weapon Skill Development (WSD), Joint Fires Training (JFT), and Use of Force (UoF), into a single capability that can be conducted simultaneously or individually and enable physical movement/exertion related to the execution of Soldier/Marine individual and squad collective training tasks. The system is required to be man transportable and deployable worldwide. It delivers training at the Point of Need (PoN) supporting Army-wide formations such as artillery, Military Police, and units for weapons skills development.

Two (2) OTAs awarded in FY 2019 in support of S/SVT prototype initiatives: SiVT (IVAS) Holistic Joint with Soldier Lethality, and SVT Weapons Optimization (market research only). Confidence events and evaluation criteria were built into the OTAs to determine technical availability and readiness in support of 4Q 2021 IOC. Prime(s) and Sub-vendors will execute the agreement(s) through an Agile development process with established success criteria and their DevOps processes. Vendors will



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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604121A / <i>Synthetic Training Environment Refinement &amp; Prototyping</i>	<b>Project (Number/Name)</b> SV1 / <i>Soldier/Squad Virtual Trainer</i>

continually include the Government and all stakeholders (Internal and external) in the Agile development process. This process will ensure all parties have transparency and early input into the design effort and success of the product(s) being developed for the STE.



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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2022 Army</b>		<b>Date: May 2021</b>
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604121A / <i>Synthetic Training Environment Refinement &amp; Prototyping</i>	<b>Project (Number/Name)</b> SV1 / <i>Soldier/Squad Virtual Trainer</i>

Event Name	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
IVAS/HUD 3.0 (Squad Immersive)																												
SVT (Soldier Virtual)																												
IOC									1																			
FOC																					2							

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604121A / <i>Synthetic Training Environment Refinement &amp; Prototyping</i>	<b>Project (Number/Name)</b> SV1 / <i>Soldier/Squad Virtual Trainer</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
IVAS/HUD 3.0 (Squad Immersive)	2	2018	1	2021
SVT (Soldier Virtual)	2	2019	4	2021
IOC	4	2021	4	2021
FOC	4	2025	4	2025

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2022 Army **Date:** May 2021

<b>Appropriation/Budget Activity</b>					<b>R-1 Program Element (Number/Name)</b>							
2040: <i>Research, Development, Test &amp; Evaluation, Army / BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>					PE 0604134A / <i>Counter Improvised-Threat Demonstration, Prototype Development, and Testing</i>							
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022 Base</b>	<b>FY 2022 OCO</b>	<b>FY 2022 Total</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>FY 2026</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
Total Program Element	-	-	13.326	13.379	-	13.379	-	-	-	-	-	-
CD4: <i>Counter Improvised-Threat Demonstration</i>	-	-	13.326	13.379	-	13.379	-	-	-	-	-	-

**A. Mission Description and Budget Item Justification**

This Program Element (PE) develops prototypes and demonstrates technology for detecting and defeating Improvised Explosive Devices (IED). The goal of this Project is to mature technology to increase the ability of deployed forces to positively identify IEDs with minimal false alarms and increase the rate of advance of route clearance missions. Additionally the objective is to positively neutralize or mitigate the effects of IEDs with minimal collateral damage. Driven by the current threat facing deployed U.S. forces, this PE enables rapid development and delivery of capabilities that enable the detection, neutralization, and risk mitigation of IEDs and their effects. These technologies are intended to be matured and demonstrated for integration onto existing Department of Defense weapon systems.

This PE is coordinated with the Under Secretary of Defense for Research and Engineering (USD/R&E) including the Defense Threat Reduction Agency (DTRA).

Work in this PE was previously conducted under PE 0604134BR, Counter Improvised-Threat Technology Demonstration, Prototype Development, and Testing.

<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022 Base</b>	<b>FY 2022 OCO</b>	<b>FY 2022 Total</b>
Previous President's Budget	0.000	13.831	14.650	-	14.650
Current President's Budget	0.000	13.326	13.379	-	13.379
Total Adjustments	0.000	-0.505	-1.271	-	-1.271
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-0.505			
• Adjustments to Budget Years	-	-	-1.271	-	-1.271

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**Exhibit R-2A, RDT&E Project Justification:** PB 2022 Army **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604134A / <i>Counter Improvised-Threat Demonstration, Prototype Development, and Testing</i>	<b>Project (Number/Name)</b> CD4 / <i>Counter Improvised-Threat Demonstration</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
CD4: <i>Counter Improvised-Threat Demonstration</i>	-	-	13.326	13.379	-	13.379	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

This Project develops prototypes and demonstrates technology for detecting and defeating Improvised Explosive Devices (IED). The goal of this Project is to mature technology to increase the ability of deployed forces to positively identify IEDs with minimal false alarms and increase the rate of advance of maneuver forces. Additionally the objective is to positively neutralize IEDs with minimal collateral damage. Driven by the current threat facing deployed U.S. forces, this Project enables rapid development and delivery of capabilities that enable the detection, neutralization, and mitigation of IEDs and their effects.

This Project is coordinated with the Under Secretary of Defense for Research and Engineering (USD/R&E) including the Defense Threat Reduction Agency (DTRA).

**B. Accomplishments/Planned Programs (\$ in Millions)**

	FY 2020	FY 2021	FY 2022
<p><b>Title:</b> Vehicle Borne IED Detection Technology Demonstration</p> <p><b>Description:</b> This effort conducts technology demonstration of sensing technologies to detect IEDs at entry control points for fixed bases. This effort uses nuclear quadropole resonance detection sensors matured in FY 2020 by the Defense Threat Reduction Agency to detect Vehicle Borne IEDs at vehicle check point with minimal false alarms.</p> <p><b>FY 2021 Plans:</b> Will integrate nuclear quadropole resonance detection sensor into a vehicle check point. Will demonstrate the ability of the sensor to detect IEDs concealed in a vehicle.</p> <p><b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> This demonstration completes in FY 2021.</p>	-	1.903	-
<p><b>Title:</b> Vehicle Borne IED Warnings and Indicators Technology Demonstration</p> <p><b>Description:</b> This effort demonstrates fusion of existing sensing technologies to provide warnings and indicators for the presence of Vehicle Borne IEDs in areas surrounding fixed sites. This effort uses detection techniques matured in FY 2020 by the Defense Threat Reduction Agency to predict the presence of Vehicle Borne IEDs using information collected by sensor systems located in the vicinity of fixed sites.</p> <p><b>FY 2021 Plans:</b></p>	-	1.292	-

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army		<b>Date:</b> May 2021		
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604134A / <i>Counter Improvised-Threat Demonstration, Prototype Development, and Testing</i>	<b>Project (Number/Name)</b> CD4 / <i>Counter Improvised-Threat Demonstration</i>		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
Will conduct a demonstration of detection techniques applied to data collected by local sensor systems to identify indicators of Vehicle Borne IEDs.  <b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> This demonstration completes in FY 2021.				
<b>Title:</b> Radio Controlled IED Detection Technology Demonstration  <b>Description:</b> This effort demonstrates Radio Controlled IED detection exploiting advanced network techniques. This effort demonstrates the ability to detect Radio Controlled IEDs with minimal false alarms.  <b>FY 2021 Plans:</b> Will apply advanced network techniques to identify Radio Controlled IEDs at standoff distances. Will perform test and evaluation of the detection techniques and document for urgent materiel release purposes.  <b>FY 2022 Plans:</b> Will continue evaluation of advanced network techniques to identify Radio Controlled IEDs at standoff distances.  <b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> Funding decrease represents the planned progression of this effort that has been decided to continue into FY 2022.		-	2.500	1.954
<b>Title:</b> Anti-Armor IED Detection Technology Demonstration  <b>Description:</b> This effort demonstrates anti-armor IED detection using technologies to include high resolution electro-optical / infrared sensors to detect component characteristics to identify the location of IEDs prior to detonation.  <b>FY 2021 Plans:</b> Will conduct a demonstration of the use of advanced electro-optical / infrared sensor processing techniques to detect component characteristics to identify the location potential IEDs. Will demonstrate the ability of these sensors to detect anti-armor IEDs at a standoff distance and quantify false alarm rates using a cluttered demonstration area. Will perform test and evaluation of the sensor technology and document for urgent materiel release purposes.  <b>FY 2022 Plans:</b> Will conduct an integrated vehicle demonstration of the use of advanced electro-optical / infrared sensor processing techniques to detect component characteristics to identify the location potential anti-armor IEDs at a standoff distance while moving. Will perform test and evaluation of the integrated vehicle system.  <b>FY 2021 to FY 2022 Increase/Decrease Statement:</b>		-	2.489	1.805

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army		<b>Date:</b> May 2021		
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604134A / <i>Counter Improvised-Threat Demonstration, Prototype Development, and Testing</i>	<b>Project (Number/Name)</b> CD4 / <i>Counter Improvised-Threat Demonstration</i>		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
Funding decrease is based on a decision to continue this promising technology to another phase of integrated demonstration.				
<p><b>Title:</b> Mitigation of Anti-Armor IED Technology Demonstration</p> <p><b>Description:</b> This effort demonstrates mitigation of Anti-Armor IED effects using technologies developed by the Defense Threat Reduction Agency in FY 2020. This effort will demonstrate the use of physical countermeasure technology to mitigate the effects of explosively formed penetrators and other explosively driven IED threats.</p> <p><b>FY 2021 Plans:</b> Demonstrate the Anti-Armor IED mitigation technology using surrogate threat IEDs to evaluate the residual effects of the IED on a surrogate armor plate.</p> <p><b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> This demonstration completes in FY 2021.</p>		-	0.530	-
<p><b>Title:</b> Booby Trap Structure IEDs Detection Technology Demonstration</p> <p><b>Description:</b> This effort demonstrates detection techniques developed by DTRA in FY 2020 using small unmanned aerial systems (UAS) with compact sensor technologies including light detection and ranging (LIDAR) to develop high resolution imagery of structures with the ability to inspect multi-level structures for the presence of IEDs. This effort demonstrates the ability to develop high fidelity mapping of multi-level structures to identify potential locations of IEDs.</p> <p><b>FY 2021 Plans:</b> Will continue development of compact LIDAR sensor technologies for use on small platforms. Will demonstrate the ability of to detect concealed IEDs in an multi-level urban structure using a micro UAS.</p> <p><b>FY 2022 Plans:</b> Will continue development of compact sensor technologies for use on individual Soldiers to detect concealed IED components in urban environments.</p> <p><b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> Funding decrease is based on a decision to continue this promising technology to develop and test a prototype system.</p>		-	2.444	1.256
<p><b>Title:</b> Personnel Borne IED Detection Technology Demonstration</p> <p><b>Description:</b> This effort demonstrates Personnel Borne IED (PBIED) detection aggregating information from a network of small, inexpensive sensor technologies including electro-optical and millimeter wave radar subgarment imagers to sense the presence of</p>		-	2.168	2.741



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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604134A / <i>Counter Improvised-Threat Demonstration, Prototype Development, and Testing</i>	<b>Project (Number/Name)</b> CD4 / <i>Counter Improvised-Threat Demonstration</i>

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
<p>PBIEDs attached to personnel through thin walls. This effort demonstrates the ability to aggregate sensor data to identify PBIEDs with minimal false alarms.</p> <p><b>FY 2021 Plans:</b> Will mature sensor fusion technologies to identify concealed PBIEDs in various environments. Will perform test and evaluation of the sensor technology and document for urgent material release purposes.</p> <p><b>FY 2022 Plans:</b> Will continue to mature integrated (fused) multi-mode sensor technologies to identify concealed Personnel Borne IEDs in various environments. Will continue to perform test and evaluation of the prototype sensor technology and document for urgent material release purposes.</p> <p><b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> Funding decrease is based on a decision to continue this promising technology to develop and test a prototype system.</p>			
<p><b>Title:</b> Off-Route IED Detection Technology Demonstration</p> <p><b>Description:</b> This effort will demonstrate a proof of concept IED detection system using miniaturized sensors developed in the Counter-Improvised Threat Simulation Program Element 0603134A integrated with unmanned aerial systems to detect off-route IEDs to support combat maneuver forces.</p> <p><b>FY 2022 Plans:</b> Will integrate miniature detection sensors such as hyper-spectral imaging and ground penetrating radar with unmanned aerial systems. Will develop plans for aerial route detection proof of concept experimentation to be conducted in FY 2023.</p> <p><b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> This is a new effort in FY 2022.</p>	-	-	3.293
<p><b>Title:</b> Water-Borne IED Detection Technology Demonstration</p> <p><b>Description:</b> This effort conducts a technology demonstration to evaluate the performance of IED detection technologies in coastal water and water gap crossings. The focus is on detecting devices in water using detection mechanisms at standoff distances to protect troop landings and water gap crossings for the military.</p> <p><b>FY 2022 Plans:</b></p>	-	-	2.330

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army	<b>Date:</b> May 2021
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<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604134A / <i>Counter Improvised-Threat Demonstration, Prototype Development, and Testing</i>	<b>Project (Number/Name)</b> CD4 / <i>Counter Improvised-Threat Demonstration</i>
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<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	FY 2020	FY 2021	FY 2022
Will integrate mature sensor technologies on a platform capable of operating ahead of formations in both troop landings and water gap crossings. Will plan a demonstration for FY 2024 using the demonstration platform to detect IED threats in both a coastal and water crossing scenario.  <b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> This is a new effort in FY 2022.			
<b>Accomplishments/Planned Programs Subtotals</b>	-	13.326	13.379

**C. Other Program Funding Summary (\$ in Millions)**  
N/A

**Remarks**

**D. Acquisition Strategy**  
The Army will coordinate plans with USD (R&E), DTRA, and other Services to prototype and demonstrate CIED technologies, with Army and Service Laboratories and/or industry performing the demonstration activities. The Army will use existing and new contracts to perform these efforts with selected industry partners based on solicitations issued. The Army will continue promising technology demonstrations started in FY20 by DTRA based on review with DTRA, USD (R&E) and other Services.

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army** **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604134A / <i>Counter Improvised-Threat Demonstration, Prototype Development, and Testing</i>	<b>Project (Number/Name)</b> CD4 / <i>Counter Improvised-Threat Demonstration</i>
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<b>Product Development (\$ in Millions)</b>				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Vehicle Borne IED Detection Technology Demonstration	C/TBD	To Be Determined : To Be Determined	-	-		1.903	Dec 2020	-		-		-	0.000	1.903	-
Vehicle Borne IED Warnings and Indicators Technology Demonstration	C/TBD	TBD : TBD	-	-		1.292		-		-		-	0.000	1.292	-
Remote Controlled IED Detection Technology Demonstration	C/TBD	TBD : TBD	-	-		2.500	Dec 2020	1.954	Dec 2021	-		1.954	0.000	4.454	-
Anti-Armor IED Detection Technology Demonstration	C/TBD	TBD : TBD	-	-		2.489	Dec 2020	1.805	Dec 2021	-		1.805	0.000	4.294	-
Mitigation of Anti-Armor IED Technology Demonstration	C/TBD	TBD : TBD	-	-		0.530		-		-		-	0.000	0.530	-
Booby Trap Structure IEDs Detection Technology Demonstration	Various	TBD : TBD	-	-		2.444		1.256	Dec 2021	-		1.256	0.000	3.700	-
Personnel Borne IED Detection Technology Demonstration	C/TBD	TBD : TBD	-	-		2.168		2.741	Dec 2021	-		2.741	0.000	4.909	-
Off-Route IED Detection Technology Demonstrator	TBD	TBD : TBD	-	-		-		3.293	Feb 2022	-		3.293	0.000	3.293	-
Water-Borne IED Detection Technology Demonstration	TBD	TBD : TBD	-	-		-		2.330	Feb 2022	-		2.330	0.000	2.330	-
<b>Subtotal</b>			-	-		13.326		13.379		-		13.379	0.000	26.705	N/A

	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract	
<b>Project Cost Totals</b>		-	-	13.326	13.379	-	13.379	0.000	26.705	N/A

**Remarks**

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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2022 Army</b>		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604134A / <i>Counter Improvised-Threat Demonstration, Prototype Development, and Testing</i>	<b>Project (Number/Name)</b> CD4 / <i>Counter Improvised-Threat Demonstration</i>

Event Name	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Vehicle Borne IED Detection Technology Demonstration					Vehicle Borne IED Detection Technology Demonstration																							
VBIED Detection Integration									VBIED Detection Integration																			
VBIED Detection Demonstration									VBIED Demonstration Event																			
Vehicle Borne IED Warnings and Indicators Technology Demonstration									Predictive Vehicle Borne IED Detection Technology Demonstration																			
Radio Controlled IED Detection Technology Demonstration									Radio Controlled IED Detection Technology Demonstration																			
Radio Controlled IED Detection Technique Maturation									Radio Controlled IED Detection Technique Maturation																			
Radio Controlled IED Detection Demonstration									Radio Controlled IED Detection Demonstration																			
Radio Controlled IED Detection Phase 2 Demonstration													Radio Controlled IED Detection Phase 2 Demonstration															
Anti-Armor IED Detection Technology Demonstration									Anti-Armor IED Detection Technology Demonstration																			
Anti-Armor IED Detection Technique Maturation									Anti-Armor IED Detection Technique Maturation																			
Anti-Armor IED Detection Demonstration									Anti-Armor IED Detection Demonstration																			
Mounted Anti-Armor IED Detection Demonstration													Mounted Anti-Armor IED Detection Demonstration															
Mitigation of Anti-Armor IED Technology Demonstration									Anti-Armor IED Mitigation Technology Demonstration																			

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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2022 Army</b>		<b>Date: May 2021</b>
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604134A / Counter Improvised-Threat Demonstration, Prototype Development, and Testing	<b>Project (Number/Name)</b> CD4 / Counter Improvised-Threat Demonstration

Event Name	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Booby Trap Structure IEDs Detection Technology Demonstration									Booby Trap Detection Technology Demonstration																			
Personnel Borne IED Detection Technology Demonstration									Personnel Borne IED Detection Technology Demonstration																			
Off-Route IED Detection Technology Demonstration													Off-Route IED Detection Technology Demonstration															
Water-Borne IED Detection Technology Demonstration													Water-Borne IED Detection Technology Demonstration															

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<b>Exhibit R-4A, RDT&amp;E Schedule Details: PB 2022 Army</b>		<b>Date: May 2021</b>
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604134A / <i>Counter Improvised-Threat Demonstration, Prototype Development, and Testing</i>	<b>Project (Number/Name)</b> CD4 / <i>Counter Improvised-Threat Demonstration</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Vehicle Borne IED Detection Technology Demonstration	1	2021	4	2021
VBIED Detection Integration	1	2021	3	2021
VBIED Detection Demonstration	4	2021	4	2021
Vehicle Borne IED Warnings and Indicators Technology Demonstration	1	2021	4	2021
Radio Controlled IED Detection Technology Demonstration	1	2021	4	2023
Radio Controlled IED Detection Technique Maturation	1	2021	4	2021
Radio Controlled IED Detection Demonstration	4	2021	4	2021
Radio Controlled IED Detection Phase 2 Demonstration	1	2022	4	2023
Anti-Armor IED Detection Technology Demonstration	1	2021	4	2022
Anti-Armor IED Detection Technique Maturation	1	2021	3	2021
Anti-Armor IED Detection Demonstration	3	2021	4	2021
Mounted Anti-Armor IED Detection Demonstration	1	2022	4	2022
Mitigation of Anti-Armor IED Technology Demonstration	2	2021	3	2021
Booby Trap Structure IEDs Detection Technology Demonstration	1	2021	4	2022
Personnel Borne IED Detection Technology Demonstration	1	2021	4	2023
Off-Route IED Detection Technology Demonstration	1	2022	4	2023
Water-Borne IED Detection Technology Demonstration	1	2022	4	2024

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**Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Army** **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040: <i>Research, Development, Test &amp; Evaluation, Army / BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0604182A / <i>Hypersonics</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	-	394.619	832.166	300.928	-	300.928	-	-	-	-	-	-
HX1: <i>Long-Range Hypersonic Weapon</i>	-	394.619	832.166	300.928	-	300.928	-	-	-	-	-	-

**Note**

This funding will transition the Budget Activity (BA) 4 activities managed by the Rapid Capabilities and Critical Technologies Office (RCCTO) within Program Element (PE) 0604182A / Hypersonics to a Program of Record managed by Program Executive Office (PEO) Missiles and Space within PE 0605232A / Hypersonics EMD.

**A. Mission Description and Budget Item Justification**

The Program Element (PE) 0604182A Hypersonics funds the Rapid Capabilities and Critical Technologies Office (RCCTO) hypersonic effort. This includes the development and prototype fielding of HX1 Long-Range Hypersonic Weapon to suppress adversary Long Range Fires and engage other high payoff/time critical targets.

**B. Program Change Summary (\$ in Millions)**

	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022 Base</u>	<u>FY 2022 OCO</u>	<u>FY 2022 Total</u>
Previous President's Budget	404.000	801.417	526.501	-	526.501
Current President's Budget	394.619	832.166	300.928	-	300.928
Total Adjustments	-9.381	30.749	-225.573	-	-225.573
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	60.000			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-9.381	-29.251			
• Adjustments to Budget Years	-	-	-225.573	-	-225.573

**Congressional Add Details (\$ in Millions, and Includes General Reductions)**

**Project:** HX1: *Long-Range Hypersonic Weapon*

Congressional Add: *Transfer from RDTE, DW line 124*

Congressional Add: *Program increase*

Congressional Add: *Program increase - hypersonic and strategic materials and structures center of excellence*

Congressional Add: *Program increase - hypersonic glide body risk reduction*

	FY 2020	FY 2021
	31.000	-
	130.000	-
	15.000	-
	-	50.000

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2022 Army	<b>Date:</b> May 2021
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<b>Appropriation/Budget Activity</b> 2040: <i>Research, Development, Test &amp; Evaluation, Army / BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0604182A / <i>Hypersonics</i>
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**Congressional Add Details (\$ in Millions, and Includes General Reductions)**

Congressional Add: *Program increase - hypersonic and strategic materials and structures*

Congressional Add Subtotals for Project: HX1

Congressional Add Totals for all Projects

	FY 2020	FY 2021
	-	10.000
	176.000	60.000
	176.000	60.000

**Change Summary Explanation**

The decrease in FY2022 (\$225.573M) from the previous President's Budget is due to several factors: (\$190M) reallocated to PE 0604644A to support Mobile Intermediate Range Missile (MIRM)/ Medium Range Capability (MRC), (\$31.851M) reallocated to PE 0605232A to support subsequent LRHW batteries under the program of record, and (\$3.722M) decrease for inflation rates for non-pay and non-fuel purchases.



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**Exhibit R-2A, RDT&E Project Justification:** PB 2022 Army **Date:** May 2021

Appropriation/Budget Activity 2040 / 4					R-1 Program Element (Number/Name) PE 0604182A / Hypersonics				Project (Number/Name) HX1 / Long-Range Hypersonic Weapon			
COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
HX1: Long-Range Hypersonic Weapon	-	394.619	832.166	300.928	-	300.928	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**Note**

This funding will transition the Budget Activity (BA) 4 activities managed by the Rapid Capabilities and Critical Technologies Office (RCCTO) within Program Element (PE) 0604182A / Hypersonics to a Program of Record managed by Program Executive Office (PEO) Missiles and Space within PE 0605232A / Hypersonics EMD.

**A. Mission Description and Budget Item Justification**

Project HX1 Long-Range Hypersonic Weapon funds the RCCTO to field an experimental prototype Hypersonic Weapon System with residual combat capability at the Battery Level as part of the Strategic Fires Battalion in support of Multi-domain Operations by the end of FY 2023 with initial fielding of all ground support equipment less live rounds by the end of FY 2021. The Long Range Hypersonic Weapon (LRHW) system will provide the Army a prototype strategic attack weapon system to defeat Anti Access/Area Denial (A2/AD) capabilities, suppress adversary Long Range Fires, and engage other high payoff/time critical targets. The Army is working closely with the Navy in the development of the LRHW. LRHW is common with the Common Hypersonic Glide Body (CHGB), and the Navy 34.5 inch booster. Additionally, the LRHW will use an existing C2 Network, Advanced Field Artillery Tactical Data System (AFATDS).

In 4Q FY 2019, CHGB Other Transactional Agreement (OTA) with Dynetics Technical Solutions (DTS) was awarded. CHGB production schedule was coordinated across all CHGB partners. Utilization of Navy contract for Army All Up Round and Cannister (AUR+C) completed 1Q FY 2020 with Preliminary Design Review (PDR) completed 2Q FY 2020. For the Integration of the LRHW, OTA award to Lockheed Martin Space on 4Q FY 2019. The Transporter / Erector / Launcher (TEL) PDR completed 2Q FY 2020. In 2Q FY 2020, a successful Flight Experiment (FE-2) with the NAVY was conducted.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	FY 2020	FY 2021	FY 2022
<b>Title:</b> Long Range Hypersonic Weapon	218.619	772.166	-
<b>Description:</b> Funding is provided for planning, prototype manufacturing and testing of the Long Range Hypersonic Weapon.			
<b>FY 2021 Plans:</b> During FY 2021, LRHW will conduct a flight test (FT-3). During FY 2021, LRHW subsystems and components will continue fabrication with first articles. First articles will undergo testing and integration culminating in an initial prototype. Concurrent with LRHW prototype manufacturing, flight tests will occur to validate designs of the CHGB and booster stack. Flight test data collected will be used to anchor the system models and simulations. The government will continue to work with industry to expand the industrial base for the Thermal Protection System (TPS).			
<b>FY 2021 to FY 2022 Increase/Decrease Statement:</b>			

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army		<b>Date:</b> May 2021		
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604182A / <i>Hypersonics</i>	<b>Project (Number/Name)</b> HX1 / <i>Long-Range Hypersonic Weapon</i>		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
The \$530.17M decrease is due to completion of the procurement of Long Lead Items (LLI) and a decrease in system design efforts. Details of the FY22 plans are depicted below.				
<p><b>Title:</b> Common Hypersonic Glide Body (CHGB)</p> <p><b>Description:</b> This effort is the development, purchase of the hardware, integration, assembly, test and delivery of the Common Hypersonic Glide Body (CHGB) system for the missile.</p> <p><b>FY 2022 Plans:</b> Common Hypersonic Glide Body (CHGB):</p> <p>In FY2022, fabrication and assembly of Common Hypersonic Glide Body (CHGB) prototypes will ramp up to support flight test events in FY2022 and FY2023. Primary efforts include material buy and manufacturing, assembly, test and checkout of the CHGB components and subsystems. Additional effort includes initial subassembly acquisition activities for the CHGB assets supporting the Army's first LRHW battery. To support the fabrication of future glide bodies, the CHGB contractor (Dynerics) will finalize the installation of the second production line. The new industry TPS integrator will begin shadowing the Government TPS project office as part of the leader-follower construct to transition production responsibility from a government lab to industry.</p> <p><b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> In PB 2021 R-Form, all costs (FY2020-FY2025) were captured for LRHW under one program activity (Long Range Hypersonic Weapon). For PB 2022 R-Form, additional program details were added.</p>		-	-	21.092
<p><b>Title:</b> All Up Round and Canister (AUR+C)</p> <p><b>Description:</b> This effort is the development, purchase of the hardware, integration, assembly, test and delivery of the All Up Round and Canister.</p> <p><b>FY 2022 Plans:</b> In FY2022, fabrication and assembly of AUR+C prototypes will ramp up to support flight test events over FY2022 and FY2023. Fabrication and assembly of AUR+C prototypes ramps up to support delivery of the tactical assets for fielding in FY2023. Primary efforts include assembly, integration, test and checkout of the AUR+C components and subsystems and continued maturation of flight software. Delivery of AUR and Canister hardware for Insensitive Munition and Hazard Classification (IM/HC) testing and execution of IM/HC tests begins.</p> <p><b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> In PB 2021 R-Form, all costs (FY2020-FY2025) were captured for LRHW under one program activity (Long Range Hypersonic Weapon). For PB 2022 R-Form, additional program details were added.</p>		-	-	84.501
<b>Title:</b> Ground Support Equipment (GSE)		-	-	118.784

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604182A / <i>Hypersonics</i>	<b>Project (Number/Name)</b> HX1 / <i>Long-Range Hypersonic Weapon</i>

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
<p><b>Description:</b> This funding is provided for planning, manufacturing and systems integration efforts for the Battery Operations Center (BOC), Transporter Erector Launcher (TEL), and the Fielding and Transition efforts of the LRHW program.</p> <p><b>FY 2022 Plans:</b> Supports software and hardware sub-component testing and integration events utilizing Transporter Erector Launcher (TEL) and Battery Operations Center (BOC) driving hardware and software changes. This is done to minimize variables at full scale system testing events to reduce risk during high cost events. Includes weapons systems integration events and ground test events to include TEL, BOC and AUR+C in support of SHOTL, JFC-2 and JFC-3 flight tests followed by post test data analysis and evaluation. New Equipment Training and Contractor Logistics Support for fielded equipment efforts include repair and replace of unique components based on system failures to maintain an Army-required level of operational readiness. Development of the product-level technical data package documenting the design of the TEL and BOC. Software development to incorporate design changes resulting from flight testing as well as user feedback. Engineering support to provide expanded capabilities for wireless communications between the BOC and TELs as well as hardware or software modifications necessary to integrate missile or GSE upgrades.</p> <p><b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> In PB 2021 R-Form, all costs (FY2020-FY2025) were captured for LRHW under one program activity (Long Range Hypersonic Weapon). For PB 2022 R-Form, additional program details were added.</p>			
<p><b>Title:</b> Test and Evaluation</p> <p><b>Description:</b> Test and evaluation includes costs of coordination, execution and post test analysis of 4 major flight tests (Flight Test-3, Joint Flight Campaign-1 (JFC-1), JFC-2 and JFC-3). Also provides required support for environmental testing.</p> <p><b>FY 2022 Plans:</b> In FY2022, 2 major tests will be executed to include JFC-1 and JFC-2. JFC-1 will be executed in 1Q FY2022. FY2022 costs include Post Flight Test analysis. Test execution of JFC-1 involves a single stool launch of the first production All Up Round (AUR) from Pacific Missile Range Facility (PMRF). JFC-2 will be executed in 4Q FY2022. FY2022 costs include range costs at Cape Canaveral Space Force Station (CCSFS) and support of integration efforts at Lockheed Martin (LM) and Redstone Arsenal (RSA) prior to the flight test. It includes costs of all the sensor, test resources, mission planning and execution costs. JFC-3 will be executed in 2Q FY2023. FY2022 costs include objective development and range costs. Also will conduct Environmental testing.</p> <p><b>FY 2021 to FY 2022 Increase/Decrease Statement:</b></p>	-	-	76.551

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army	<b>Date:</b> May 2021
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<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604182A / <i>Hypersonics</i>	<b>Project (Number/Name)</b> HX1 / <i>Long-Range Hypersonic Weapon</i>
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<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
In PB 2021 R-Form, all costs (FY2020-FY2025) were captured for LRHW under one program activity (Long Range Hypersonic Weapon). For PB 2022 R-Form, additional program details were added.			

<b>Accomplishments/Planned Programs Subtotals</b>	218.619	772.166	300.928
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	FY 2020	FY 2021
<b>Congressional Add:</b> Transfer from RDTE, DW line 124	31.000	-
<b>FY 2020 Accomplishments:</b> Transfer from RDTE, DW line 124		
<b>Congressional Add:</b> Program increase	130.000	-
<b>FY 2020 Accomplishments:</b> Program increase		
<b>Congressional Add:</b> Program increase - hypersonic and strategic materials and structures center of excellence	15.000	-
<b>FY 2020 Accomplishments:</b> Program increase - hypersonic and strategic materials and structures center of excellence		
<b>Congressional Add:</b> Program increase - hypersonic glide body risk reduction	-	50.000
<b>FY 2021 Plans:</b> Common Hypersonic Glide Body (CHGB) production will ramp up with the purchase of additional equipment. RCCTO will purchase critical spare parts to offset risk for flight tests. RCCTO will further develop critical skills and infrastructure to increase CHGB rate production and accommodate upgrades and will improve supplier base and manufacturing capabilities. RCCTO will develop automated test equipment and design and develop CHGB test articles for use in CHGB or AUR risk reduction and safety testing. The production engineering effort to make design more affordable will continue.		
<b>Congressional Add:</b> Program increase - hypersonic and strategic materials and structures	-	10.000
<b>FY 2021 Plans:</b> Data inputs for the National Hypersonic Materials Database will be provided. Environments and design test matrices will be defined. Materials and fabricate specimens will be purchased. Framework for database will be initialized. Metal materials will be characterized and initial non-metal characterized. Additive manufacturing (metals) research will be conducted. Develop and characterize materials for the Common Hypersonic Glide Body (CHGB) Thermal Protection System (TPS) including Carbon-Carbon and other extreme hi-temp materials will be conducted.		
<b>Congressional Adds Subtotals</b>	176.000	60.000

**C. Other Program Funding Summary (\$ in Millions)**

N/A

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Army Date: May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604182A / <i>Hypersonics</i>	<b>Project (Number/Name)</b> HX1 / <i>Long-Range Hypersonic Weapon</i>
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**C. Other Program Funding Summary (\$ in Millions)**

**Remarks**

**D. Acquisition Strategy**

The Army will field an experimental prototype Hypersonic Weapons System with residual operational capability NLT FY 2023 at the Battery Level as part of the Strategic Fires Battalion in support of Multi-domain Operations. CLS will be provided for one year following the delivery of the first battery. RCCTO uses a combination of Other Transaction Authority's (OTA's) and the Navy Conventional Prompt Strike (CPS) contract with Lockheed Martin. Long lead procurement is required 2 years prior to delivery resulting in a significant ramp up of funding in FY 2021 to meet the FY 2022 manufacturing and FY 2023 fielding requirement. Quick awards of the OTA and Navy CPS contracts ensure procurements are executed with adequate time to execute the funds and program requirements. A SETA contract provides support to the Government Project Office. The PEO MS transition team is currently embedded within RCCTO to ensure an efficient transition in FY 2024 as a program of record.

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army** **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604182A / Hypersonics	<b>Project (Number/Name)</b> HX1 / Long-Range Hypersonic Weapon
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<b>Management Services (\$ in Millions)</b>				<b>FY 2020</b>		<b>FY 2021</b>		<b>FY 2022 Base</b>		<b>FY 2022 OCO</b>		<b>FY 2022 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>			
Government Personnel and Operations Support	Various	Project Office Support : Huntsville, AL	-	24.823		28.606		-		-		-	0.000	53.429	-
CHGB: Government Personnel and Operations Support	Various	Project Office Support : Huntsville, AL	-	-		-		6.089		-		6.089	11.659	17.748	Continuing
AUR+C: Government Personnel and Operations Support	Various	Project Office Support : Huntsville, AL	-	-		-		7.424		-		7.424	12.510	19.934	Continuing
GSE: Government Personnel and Operations Support	Various	Project Office Support : Huntsville, AL	-	-		-		9.160		-		9.160	14.281	23.441	Continuing
Test: Government Personnel and Operations Support	Various	Project Office Support : Huntsville, AL	-	-		-		7.002		-		7.002	11.340	18.342	Continuing
<b>Subtotal</b>			-	24.823		28.606		29.675		-		29.675	49.790	132.894	N/A

<b>Product Development (\$ in Millions)</b>				<b>FY 2020</b>		<b>FY 2021</b>		<b>FY 2022 Base</b>		<b>FY 2022 OCO</b>		<b>FY 2022 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>			
Contracts for technology development, and weapon design, integration, prototyping and testing	C/Various	various : multiple	-	369.796		803.560		-		-		-	0.000	1,173.356	Continuing
CHGB: Dynetics Technical Solution (DTS)	C/CPFF	Manufacturing of the CHGB : Huntsville, AL	-	-		-		5.000		-		5.000	25.997	30.997	Continuing
CHGB: Various	Various	CHGB/TPS : Huntsville, AL	-	-		-		11.577		-		11.577	4.671	16.248	Continuing
AUR+C: Lockheed Martin	C/Various	Manufacturing and delivery of the LRHW booster and	-	-		-		69.553		-		69.553	28.390	97.943	Continuing

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army** **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604182A / Hypersonics	<b>Project (Number/Name)</b> HX1 / Long-Range Hypersonic Weapon
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<b>Product Development (\$ in Millions)</b>				<b>FY 2020</b>		<b>FY 2021</b>		<b>FY 2022 Base</b>		<b>FY 2022 OCO</b>		<b>FY 2022 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>			
		canister : Denver, CO													
AUR+C: Various	Various	AUR+C : Multiple	-	-		-		7.523		-		7.523	3.917	11.440	Continuing
GSE: Lockheed Martin	C/CPFF	Software development and maintenance, weapons systems integration, test planning and execution support for JFC-2 and JFC-3 : Huntsville, AL	-	-		-		75.897		-		75.897	98.499	174.396	Continuing
GSE: Various	Various	Ground Spt Equipment : Huntsville, AL	-	-		-		33.727		-		33.727	18.775	52.502	Continuing
<b>Subtotal</b>			-	369.796		803.560		203.277		-		203.277	180.249	1,556.882	N/A

**Remarks**

The CHGB contractor, DTS, will be funded by additional customers of the Common Hypersonic Glide Body.

<b>Test and Evaluation (\$ in Millions)</b>				<b>FY 2020</b>		<b>FY 2021</b>		<b>FY 2022 Base</b>		<b>FY 2022 OCO</b>		<b>FY 2022 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>			
Test: Flight Test Planning and Execution	Various	Flight Test Planning and Execution : Various	-	-		-		67.976		-		67.976	5.582	73.558	Continuing
<b>Subtotal</b>			-	-		-		67.976		-		67.976	5.582	73.558	N/A

<b>Project Cost Totals</b>	<b>Prior Years</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022 Base</b>	<b>FY 2022 OCO</b>	<b>FY 2022 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
	-	394.619	832.166	300.928	-	300.928	235.621	1,763.334	N/A

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<b>Exhibit R-3, RDT&amp;E Project Cost Analysis:</b> PB 2022 Army	<b>Date:</b> May 2021
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<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604182A / <i>Hypersonics</i>	<b>Project (Number/Name)</b> HX1 / <i>Long-Range Hypersonic Weapon</i>
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	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
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**Remarks**  
Original breakout of the form is expanded to show more detail. Contracts for technology development and weapon design, integration, prototyping and testing cost category captured under Product Development is broken out into multiple cost categories. Additionally, Government Personnel and Operations Support captured under Management Services is broken out into multiple cost categories.



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**Exhibit R-4, RDT&E Schedule Profile: PB 2022 Army** **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604182A / <i>Hypersonics</i>	<b>Project (Number/Name)</b> HX1 / <i>Long-Range Hypersonic Weapon</i>
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Event Name	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Integration Systems Requirement Review	▲1																											
AUR+C Preliminary Design Review		▲2																										
GSE Preliminary Design Review			▲3																									
Launcher Preliminary Design Review			▲4																									
GSE Critical Design Review							▲5																					
CHGB Long Lead/Production																												
Launcher Design/Manufacturing																												
Delivery of Prototypes Launchers																												
LRHW Booster Deliveries																												
FT-3 Test																												
Canisters Delivered for training																												
Initial Fielding of BOC and TELs																												
Contractor Logistics Support (CLS)																												

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**Exhibit R-4, RDT&E Schedule Profile: PB 2022 Army** **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604182A / <i>Hypersonics</i>	<b>Project (Number/Name)</b> HX1 / <i>Long-Range Hypersonic Weapon</i>
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Event Name	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026												
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4									
JFC-1 Test									▲ 8																												
JFC-2 Test													▲ 9																								
Army Canister Deliviers																																					
JFC-3 Test													▲ 10																								
LRHW FUI																	▲ 11																				
Transition to PEO MS as a Program of Record																					▲ 12																

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**Exhibit R-4A, RDT&E Schedule Details:** PB 2022 Army **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604182A / <i>Hypersonics</i>	<b>Project (Number/Name)</b> HX1 / <i>Long-Range Hypersonic Weapon</i>
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Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Integration Systems Requirement Review	1	2020	1	2020
AUR+C Preliminary Design Review	2	2020	2	2020
GSE Preliminary Design Review	2	2020	2	2020
Launcher Preliminary Design Review	3	2020	3	2020
GSE Critical Design Review	1	2021	1	2021
CHGB Long Lead/Production	1	2020	4	2023
Launcher Design/Manufacturing	1	2020	4	2021
Delivery of Prototypes Launchers	4	2021	4	2021
LRHW Booster Deliveries	3	2021	4	2023
FT-3 Test	3	2021	3	2021
Canisters Delivered for training	3	2021	4	2021
Initial Fielding of BOC and TELs	4	2021	4	2021
Contractor Logistics Support (CLS)	1	2022	4	2025
JFC-1 Test	1	2022	1	2022
JFC-2 Test	4	2022	4	2022
Army Canister Delivers	1	2023	4	2023
JFC-3 Test	2	2023	2	2023
LRHW FUI	4	2023	4	2023
Transition to PEO MS as a Program of Record	4	2024	4	2024

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2022 Army **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040: <i>Research, Development, Test &amp; Evaluation, Army / BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0604403A / <i>Future Interceptor</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	-	1.918	-	7.895	-	7.895	-	-	-	-	-	-
FM3: <i>Future Interceptor</i>	-	1.918	-	7.895	-	7.895	-	-	-	-	-	-

**A. Mission Description and Budget Item Justification**

The Future Interceptor program will provide improved operational effectiveness against evolving air, missile, and hypersonic threats within the lower tier portion of the ballistic missile defense battlespace. The future interceptor will increase Air and Missile Defense (AMD) capability through increased velocity, altitude, and maneuverability.

**B. Program Change Summary (\$ in Millions)**

	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022 Base</u>	<u>FY 2022 OCO</u>	<u>FY 2022 Total</u>
Previous President's Budget	2.000	7.992	7.993	-	7.993
Current President's Budget	1.918	0.000	7.895	-	7.895
Total Adjustments	-0.082	-7.992	-0.098	-	-0.098
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-7.992			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.082	-			
• Adjustments to Budget Years	-	-	-0.098	-	-0.098

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**Exhibit R-2A, RDT&E Project Justification:** PB 2022 Army **Date:** May 2021

Appropriation/Budget Activity 2040 / 4					R-1 Program Element (Number/Name) PE 0604403A / Future Interceptor				Project (Number/Name) FM3 / Future Interceptor			
COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
FM3: Future Interceptor	-	1.918	-	7.895	-	7.895	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

**A. Mission Description and Budget Item Justification**

The Future Interceptor program will provide improved operational effectiveness against current and evolving air, missile, and hypersonic threats within the lower tier portion of the ballistic missile defense battlespace. The future interceptor will increase Air and Missile Defense (AMD) capability through increased velocity, altitude, and maneuverability. Program funding supports existing Other Transaction Agreements (OTAs) with multiple vendors currently providing definition and analysis of interceptor concepts to address the evolving theatre ballistic missile and hypersonic threats requirement. Existing OTAs are contributing to requirements definitization and subsequent execution of the Analysis of Alternatives (AoA). The acquisition program will competitively select a future interceptor to complement existing Air and Missile Defense (AMD) capabilities to overmatch evolving threat.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	FY 2020	FY 2021	FY 2022
<b>Title:</b> Program Development and Support	1.918	-	7.895
<b>Description:</b> Provide program development and support for the Future Interceptor program, including technical work, concept definition, modeling & simulation work, and other related efforts.			
<b>FY 2022 Plans:</b> -Complete execution of concept definitions through Other Transactions Agreements (OTA) -Complete simulation-based performance assessments of concept definitions -Develop Acquisition Strategy -Support development and execution of Analysis of Alternatives (AoA) and Capability Development Document			
<b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> The \$7,895K increase from FY 2021 to FY 2022 is due to the initiation of Future Interceptor studies and analysis.			
<b>Accomplishments/Planned Programs Subtotals</b>	1.918	-	7.895

**C. Other Program Funding Summary (\$ in Millions)**

Line Item	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
• C53101: MSE Missile	702.437	678.148	776.696	-	776.696	-	-	-	-	-	-

**Remarks**

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604403A / <i>Future Interceptor</i>	<b>Project (Number/Name)</b> FM3 / <i>Future Interceptor</i>

**D. Acquisition Strategy**

To provide improved operational effectiveness, the Army will use the Defense Ordnance Technology Consortium (DOTC) OTA to execute a competitive initial concept definition (CD) with multiple contractors. From the CD phase, rapid prototype development approaches will utilize detailed modeling and simulation of the future interceptor as well as conduct prototype development of high-risk hardware technologies. The prototype technologies and detailed simulation based interceptor design will be used to competitively down select to a single vendor. This approach and the resulting technologies and designs will inform the selection of Acquisition Strategy (traditional or 804 Middle Tier) most advantageous for this project. This PB21 submission presents R-4 and R-4a schedule information in traditional acquisition terminology that will be updated with 804 Middle Tier terminology if utilized.



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**Exhibit R-4, RDT&E Schedule Profile: PB 2022 Army** **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604403A / <i>Future Interceptor</i>	<b>Project (Number/Name)</b> FM3 / <i>Future Interceptor</i>
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Event Name	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Initial Concept Development	[Redacted]				[Redacted]																							
Initial Modeling & Simulation Development	[Redacted]				[Redacted]																							
Concept Development	[Redacted]				[Redacted]				[Redacted]				[Redacted]															
Modeling & Simulation Development	[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]											
Material Development Decision (MDD)	[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]											
Analysis of Alternatives	[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]							
Future Interceptor CDD	[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]							
Competitive RFP	[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]							
Contract Award Downselect	[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]							
Milestone A	[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]							



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**Exhibit R-4A, RDT&E Schedule Details: PB 2022 Army** **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604403A / <i>Future Interceptor</i>	<b>Project (Number/Name)</b> FM3 / <i>Future Interceptor</i>
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Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Initial Concept Development	2	2020	4	2020
Initial Modeling & Simulation Development	2	2020	4	2020
Concept Development	2	2022	1	2026
Modeling & Simulation Development	2	2022	4	2025
Materiel Development Decision (MDD)	4	2023	4	2023
Analysis of Alternatives	1	2025	1	2026
Future Interceptor CDD	1	2024	1	2025
Competitive RFP	1	2025	4	2025
Contract Award Downselect	3	2026	3	2026
Milestone A	3	2026	3	2026

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2022 Army **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040: Research, Development, Test & Evaluation, Army / BA 4: Advanced Component Development & Prototypes (ACD&P)	<b>R-1 Program Element (Number/Name)</b> PE 0604531A / Counter - Small Unmanned Aircraft Systems Advanced Development
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	-	-	-	19.148	-	19.148	-	-	-	-	-	-
CQ5: C-sUAS Joint New Capabilities Development	-	-	-	7.918	-	7.918	-	-	-	-	-	-
CQ6: C-sUAS Joint Enabling Capabilities Development	-	-	-	11.230	-	11.230	-	-	-	-	-	-

**Note**

This is a new start in FY 2022.

Prior year funding executed from PE0604741A FG5

**A. Mission Description and Budget Item Justification**

The Counter- small Unmanned Aircraft Systems (C-sUAS) effort is in response to the Department of Defense's (DoD) Joint Requirements Oversight Council Memorandum (JROC-M) requirement for identification, development, testing, evaluation, and integration of technologies to defeat small Unmanned Aircraft System threats across the DoD. The C-sUAS efforts provide warfighters the ability to comprehensively detect, track, identify, and defeat enemy Group 1, 2 and 3 UAS platforms. The efforts will be joint prototyping efforts to provide integrated solutions to meet the needs of the Military Services and DoD Agencies against emerging C-sUAS threats.

**B. Program Change Summary (\$ in Millions)**

	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022 Base</u>	<u>FY 2022 OCO</u>	<u>FY 2022 Total</u>
Previous President's Budget	0.000	0.000	0.000	-	0.000
Current President's Budget	0.000	0.000	19.148	-	19.148
Total Adjustments	0.000	0.000	19.148	-	19.148
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	-	-	19.148	-	19.148

**Change Summary Explanation**

This is a new start in FY22

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**Exhibit R-2A, RDT&E Project Justification:** PB 2022 Army **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4					<b>R-1 Program Element (Number/Name)</b> PE 0604531A / Counter - Small Unmanned Aircraft Systems Advanced Development				<b>Project (Number/Name)</b> CQ5 / C-sUAS Joint New Capabilities Development			
COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
CQ5: C-sUAS Joint New Capabilities Development	-	-	-	7.918	-	7.918	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**Note**

This is a new start in FY 2022.

Prior year funding executed from PE 0604741A FG5

**A. Mission Description and Budget Item Justification**

The Counter- small Unmanned Aircraft Systems (C-sUAS) effort will demonstrate, prototype, and experiments with technologies and concepts to enable or accelerate their transition to acquisition programs. The efforts will address the gap between initial technology or concept development and quickly move into a warfighter capability. Efforts will explore new concepts and their applications in potential future operating environments within a systems-of-systems context. These joint prototypes will inform future requirements and acquisition to address the evolving Small Unmanned Aircraft System threats and new environments to which C-sUAS systems must be deployed.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	FY 2020	FY 2021	FY 2022
<b>Title:</b> C-sUAS Prototyping New Joint Capabilities	-	-	7.918
<b>Description:</b> Prototyping detection and identification; defeat; and command and control technologies to meet the C-sUAS capability gaps. Prototypes will address operational requirements identified by the JROCM 078-20 and prioritized critical capability gaps identified by the DoD EA Governance.			
<b>FY 2022 Plans:</b> Continued prototype development of joint capabilities to address capability gaps in detected, identified, defeat, and enhance command and control. Technology include prototyping of High Power Microwave Ground; Command and Control Decision aids to include Automation, Autonomy, and Human-Machine Teaming; Electronic Warfare detect and defeat; High Energy Lasers; and C-sUAS Interceptors.			
<b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> Joint funding line created to address joint capabilities.			
<b>Accomplishments/Planned Programs Subtotals</b>	-	-	7.918

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604531A / Counter - Small Unmanned Aircraft Systems Advanced Development	Project (Number/Name) CQ5 / C-sUAS Joint New Capabilities Development
<b>C. Other Program Funding Summary (\$ in Millions)</b> N/A		
<b>Remarks</b>		
<b>D. Acquisition Strategy</b> The Joint C-sUAS new capability prototyping will address the Joint Requirements Oversight Council Memorandum (JROCM) 078-20 and be approved by the Department of Defense C-sUAS Executive Agent (EA) Governance. The C-sUAS EA Governance will approve the prototyping effort to meet identified gap and the joint capability will be funded under this Program Element. The Joint Counter-sUAS Office will identify new technologies within industry and Government S&T organization and leverage the flexibility of the Adaptive Acquisition Framework, and Service Acquisition Policies, and pursue a combination of acquisition pathways to deliver prototypes for evaluation and future decisions. Prototypes may be deployed for additional combat evaluations and provide residual capabilities to the warfighter.		



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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2022 Army</b>		<b>Date: May 2021</b>
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604531A / Counter - Small Unmanned Aircraft Systems Advanced Development	<b>Project (Number/Name)</b> CQ5 / C-sUAS Joint New Capabilities Development

Event Name	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
HPM Ground Increment 1 Prototyping													HPM Ground Increment 1 Prototyping															
HPM Ground Increment 1 System Test													HPM Ground Increment 1 System Test															
HPM Ground Increment 1 Prototype Delivery													1				HPM Ground Increment 1 Prototype Delivery											
C2 Decision Aids Prototyping																												

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604531A / <i>Counter - Small Unmanned Aircraft Systems Advanced Development</i>	<b>Project (Number/Name)</b> CQ5 / <i>C-sUAS Joint New Capabilities Development</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
HPM Ground Increment 1 Prototyping	1	2022	4	2022
HPM Ground Increment 1 System Test	4	2022	1	2023
HPM Ground Increment 1 Prototype Delivery	3	2023	3	2023
C2 Decision Aids Prototyping	1	2022	4	2025

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**Exhibit R-2A, RDT&E Project Justification:** PB 2022 Army **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4					<b>R-1 Program Element (Number/Name)</b> PE 0604531A / Counter - Small Unmanned Aircraft Systems Advanced Development				<b>Project (Number/Name)</b> CQ6 / C-sUAS Joint Enabling Capabilities Development			
COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
CQ6: C-sUAS Joint Enabling Capabilities Development	-	-	-	11.230	-	11.230	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**Note**

This is a new start in FY 2022.

**A. Mission Description and Budget Item Justification**

The Counter- small Unmanned Aircraft Systems (C-sUAS) enabling efforts will support the Joint C-sUAS Office in identify and prioritizing joint gaps and solutions; support Military Service programs management members to conduct joint development, acquisition, and sustainment; and identify key technologies available for transition to the warfighter, while minimize duplications and redundancy. These joint enabling efforts will inform future requirements and acquisition to address the evolving Small Unmanned Aircraft System threats and new environments to which C-sUAS systems must be deployed.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	FY 2020	FY 2021	FY 2022
<p><b>Title:</b> Joint Studies and Analysis</p> <p><b>Description:</b> Execution of JCO studies to analyze current and future capability needs to aid the advancement and transition of advanced technologies by providing the credible evidence decision makers need to make sound strategic decision and investment choices. Concepts to be analyzed included, but not limited to, application of C-sUAS technologies in new environments, analysis of joint systems architectures, artificial intelligence and machine learning applications, directed energy weapons application, and integration into multi-domain operations. Studies and Analysis will improve the effectiveness of C-sUAS operation by developing concepts that generate new information to address challenging threats of the future and aid in identifying advanced technologies for prototyping and development.</p> <p><b>FY 2022 Plans:</b> Execute studies to explore promising concepts and enabling technologies. Activities may include analysis, studies, experimentation, modeling and simulation, virtual prototyping, and workshops. Specific studies are not detailed until late FY21 to ensure they are relevant to FY22 and FY23 decisions.</p> <p><b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> New program element to capture Joint requirements</p>	-	-	3.310
<p><b>Title:</b> Common Test Range</p>	-	-	3.520



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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604531A / <i>Counter - Small Unmanned Aircraft Systems Advanced Development</i>	<b>Project (Number/Name)</b> CQ6 / <i>C-sUAS Joint Enabling Capabilities Development</i>

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
<p><b>Description:</b> Execution of JCO prototyping and experimentation of a Department of Defense common test ranges to explore new concepts and application in current and future operating environments. Test ranges must adapt to uncertainty of the evolving threat, military application of C-sUAS, and new commercial technology impacts to the battlefield environment. This ensures C-sUAS technology is adequately assessed against a realistic environment and deliver reliable capabilities to the warfighter. These advances in ranges will support the Department of Defense testing activities for C-sUS programs. This also includes updates to the DoD C-sUAS Common Test protocol to be used in all Joint C-sUAS testing activities to ensure consistency of data collection before being deployed.</p> <p><b>FY 2022 Plans:</b> Execute test range equipment prototyping of urban environmental conditions to include 5G technology, complex electro-magnetic environment, and urban terrain. Activities include prototyping range equipment, experimentation, and analysis of the effectiveness of tactics, techniques, and procedures. This will include iterative updates to the C-sUAS Test protocol.</p> <p><b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> New program element to capture Joint requirements</p>			
<p><b>Title:</b> Joint Assessments and Demonstrations</p> <p><b>Description:</b> Execute demonstrations and assessments of new C-sUAS technology to explore new concepts, new applications of existing systems, and new industry technologies. New concepts and technologies demonstrations will address future capability gaps and acquisition programs to maintain pace with evolving threats and employment environments.</p> <p><b>FY 2022 Plans:</b> Execute semi-annual demonstrations and assessments of C-sUAS technology. Demonstrations will focus on capability gaps identified by the JCO and the Executive Agent C-sUAS Governance.</p> <p><b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> New program element to capture Joint requirements</p>	-	-	4.400
<b>Accomplishments/Planned Programs Subtotals</b>	-	-	11.230

**C. Other Program Funding Summary (\$ in Millions)**

N/A

**Remarks**

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604531A / Counter - Small Unmanned Aircraft Systems Advanced Development	Project (Number/Name) CQ6 / C-sUAS Joint Enabling Capabilities Development

**D. Acquisition Strategy**

The Joint C-sUAS enabling efforts will be approved by the Department of Defense C-sUAS Executive Agent (EA) Governance. The C-sUAS EA Governance will approve efforts supporting future DoD decisions and identify gaps in current systems. The Joint Counter-sUAS Office will identify key efforts that support the mission and minimize redundancy among the Services. The Army Rapid Capabilities and Critical Technology Office (RCCTO) has been identified to provide material and acquisition support to the JCO to address enabling capability needs. Army RCCTO will semi-annually solicit industry solutions against the C-sUAS gaps and hold demonstrations at an identified C-sUAS common test range. Identified solutions from the Semi-annual Demonstration will potentially transition to modify existing C-sUAS programs, create new programs for development under PE0604531A CQ7, identify and create prototyping projects under PE0604531A CQ5, or transition to Service Science and Technology projects for further maturation. The Army RCCTO will acquire necessary equipment and evaluate new environmental conditions for the C-sUAS test ranges to ensure testing consistency and realistic conditions. Once established and validated as a test range capability, the JCO will transition long term support to the DoD's Test Resource Management Center.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army												Date: May 2021				
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)								
2040 / 4				PE 0604531A / Counter - Small Unmanned Aircraft Systems Advanced Development				CQ6 / C-sUAS Joint Enabling Capabilities Development								
<b>Management Services (\$ in Millions)</b>				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total				
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract	
Program Management	TBD	US Army Rapid Capabilities and Critical Technology Office : Fort Belvoir, VA	-	-		-		0.880		-		0.880	Continuing	Continuing	Continuing	
<b>Subtotal</b>			-	-		-		0.880		-		0.880	Continuing	Continuing	N/A	
<b>Product Development (\$ in Millions)</b>				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total				
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract	
Common Test Range	TBD	Army Rapid Capabilities and Critical Technologies Office : Fort Belvoir, VA	-	-		-		3.300		-		3.300	Continuing	Continuing	Continuing	
<b>Subtotal</b>			-	-		-		3.300		-		3.300	Continuing	Continuing	N/A	
<b>Support (\$ in Millions)</b>				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total				
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract	
Joint Studies and Analysis	TBD	Army Rapid Capabilities and Critical Technologies Office : Fort Belvoir, VA	-	-		-		3.310		-		3.310	Continuing	Continuing	Continuing	
<b>Subtotal</b>			-	-		-		3.310		-		3.310	Continuing	Continuing	N/A	

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<b>Exhibit R-3, RDT&amp;E Project Cost Analysis: PB 2022 Army</b>												<b>Date: May 2021</b>			
<b>Appropriation/Budget Activity</b> 2040 / 4				<b>R-1 Program Element (Number/Name)</b> PE 0604531A / Counter - Small Unmanned Aircraft Systems Advanced Development				<b>Project (Number/Name)</b> CQ6 / C-sUAS Joint Enabling Capabilities Development							
<b>Test and Evaluation (\$ in Millions)</b>				<b>FY 2020</b>		<b>FY 2021</b>		<b>FY 2022 Base</b>		<b>FY 2022 OCO</b>		<b>FY 2022 Total</b>			
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
Joint Assessment and Demonstration	TBD	Army Rapid Capabilities and Critical Technologies Office : Fort Belvoir, VA	-	-		-		3.740		-		3.740	Continuing	Continuing	Continuing
<b>Subtotal</b>			-	-		-		3.740		-		3.740	Continuing	Continuing	N/A
			<b>Prior Years</b>	<b>FY 2020</b>		<b>FY 2021</b>		<b>FY 2022 Base</b>		<b>FY 2022 OCO</b>		<b>FY 2022 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Project Cost Totals</b>			-	-		0.000		11.230		-		11.230	Continuing	Continuing	N/A
<b>Remarks</b>															

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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2022 Army</b>		<b>Date: May 2021</b>
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604531A / <i>Counter - Small Unmanned Aircraft Systems Advanced Development</i>	<b>Project (Number/Name)</b> CQ6 / <i>C-sUAS Joint Enabling Capabilities Development</i>

Event Name	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Joint Studies									Joint Studies execution																			
Common Test Range									Common Test Range assessments																			
Joint Assessment and Demos									Joint Assessment and Demonstration																			

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604531A / <i>Counter - Small Unmanned Aircraft Systems Advanced Development</i>	<b>Project (Number/Name)</b> CQ6 / <i>C-sUAS Joint Enabling Capabilities Development</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Joint Studies	1	2022	4	2026
Common Test Range	1	2022	4	2025
Joint Assessment and Demos	1	2022	4	2026

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**Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Army** **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040: <i>Research, Development, Test &amp; Evaluation, Army / BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0604541A / <i>Unified Network Transport</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	-	28.478	39.192	35.409	-	35.409	-	-	-	-	-	-
BT1: <i>Interoperability</i>	-	4.962	-	-	-	-	-	-	-	-	-	-
BT2: <i>Command Post Mobility/ Survivability</i>	-	5.322	9.373	8.418	-	8.418	-	-	-	-	-	-
BT3: <i>Common Operating Environment (COE)</i>	-	4.171	7.866	7.069	-	7.069	-	-	-	-	-	-
BT4: <i>Network Technology Maturation Initiatives (NTMI)</i>	-	2.301	-	-	-	-	-	-	-	-	-	-
BT5: <i>Integrated Tactical Network/Enterprise Network</i>	-	11.722	21.953	19.922	-	19.922	-	-	-	-	-	-

**A. Mission Description and Budget Item Justification**

Unified Network Transport is directly aligned to the Army Network Modernization Strategy Line of Effort 1 (LOE 1) Unified Network; LOE 2, Common Operating Environment (COE), LOE 3, Interoperability; and LOE 4, Command Post Mobility and Survivability. These efforts support advanced component development activities that are aligned to the Army's Tactical Network Capability Set development and fielding plans.

The Program Executive Office Command, Control, Communications-Tactical (PEO C3T) is responsible for prioritizing, programming, managing and executing these projects and ensuring these funds are prioritized to support the Network Cross-Functional Team (N-CFT) Army modernization priorities and prototyping. The N-CFT and PEO C3T prioritize technology demonstrations, focused evaluations, and expert analyses to inform future requirements, mature technologies, and deliver new capabilities. Efforts funded from these projects will inform technology transitions, research and development, and user assessments, and then rapidly transition to appropriate Programs of Record or be established as a new program.

Fiscal Year (FY) 2022 funds will support identification, maturation, demonstration, and evaluation of Technology Readiness Level (TRL) 6+ systems and subsystem components including, but not limited to, resilient Line of Site (LOS) and beyond Line of Sight (BLOS) communications, information systems and information management; cyber electromagnetic activities (CEMA) situational understanding and operations; intelligence fusion, cloud technologies, virtual augmentation, artificial intelligence, and data convergence and analytics in the Common Operating Environment to inform the Integrated Tactical Network/Enterprise Network and Enabling Functions, Computing Environments, Interoperability and Command Posts. Successful solutions identified through evaluation in a high fidelity and realistic operating environment will be transitioned to Programs of Record for integration and fielding. Funds will also support integration with solutions identified in the other Modernization CFT efforts to ensure network dependencies are addressed.

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2022 Army	<b>Date:</b> May 2021
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<b>Appropriation/Budget Activity</b> 2040: <i>Research, Development, Test &amp; Evaluation, Army / BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0604541A / <i>Unified Network Transport</i>
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<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022 Base</b>	<b>FY 2022 OCO</b>	<b>FY 2022 Total</b>
Previous President's Budget	29.700	40.677	40.924	-	40.924
Current President's Budget	28.478	39.192	35.409	-	35.409
Total Adjustments	-1.222	-1.485	-5.515	-	-5.515
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-1.222	-1.485			
• Adjustments to Budget Years	-	-	-5.515	-	-5.515

**Change Summary Explanation**

The N-CFT and PEO C3T will ensure that highest priority projects that inform technology transitions and narrow technology gaps are funded based on available resources in FY 2022.



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**Exhibit R-2A, RDT&E Project Justification:** PB 2022 Army **Date:** May 2021

Appropriation/Budget Activity 2040 / 4					R-1 Program Element (Number/Name) PE 0604541A / <i>Unified Network Transport</i>				Project (Number/Name) BT1 / <i>Interoperability</i>			
COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
BT1: <i>Interoperability</i>	-	4.962	-	-	-	-	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

Project BT1, Interoperability, is directly aligned to the Army Network Modernization Strategy Line of Effort (LOE) 1 and 2, Unified Network Transport and Common Operating Environment, respectively. These efforts support advanced component development activities that are aligned to the Army's Tactical Network Capability Set development and fielding plans.

The project enables Unified Action Partner Interoperability through integration into the Joint Information Environment (JIE) and the Mission Partner Environment (MPE). Interoperability is the ability to routinely act together coherently, effectively and efficiently to achieve tactical, operational, and strategic objectives. Interoperability between disparate forces allows coalitions to produce greater combat power than the sum of their parts by leveraging relative strengths while mitigating relative weaknesses.

Funding is used for technical maturation and evaluation of technologies to address gaps associated with LOE 3, Interoperability, solutions that will incorporate common commercial standards and/or widely recognized military interoperability standards. This funding will support demonstrations and experimentation, in a relevant operational environment, of key research and development (R&D) and science and technology (S&T) initiatives related to this effort, to include communications, information systems and information management; intelligence, surveillance and reconnaissance; intelligence fusion and digital fires.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	FY 2020	FY 2021	FY 2022
<b>Title:</b> BT1: Interoperability	4.962	-	-
<b>Description:</b> This funding is used to identify and acquire technologies to address gaps associated with LOE 3, Interoperability, solutions for evaluation that will incorporate abilities to leverage common commercial standards and/ or widely recognized military interoperability standards. This funding will support demonstrations and evaluations, in a relevant operational environment, of key research and development (R&D) and science and technology (S&T) initiatives related to interoperability, to include communications, information systems and information management; intelligence, surveillance and reconnaissance; intelligence fusion and digital fires.			
<b>Accomplishments/Planned Programs Subtotals</b>	4.962	-	-

**C. Other Program Funding Summary (\$ in Millions)**

N/A

**Remarks**

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**Exhibit R-2A, RDT&E Project Justification:** PB 2022 Army **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604541A / <i>Unified Network Transport</i>	<b>Project (Number/Name)</b> BT1 / <i>Interoperability</i>
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**D. Acquisition Strategy**

The Network Cross-Functional Team (N-CFT) and Program Executive Office Command, Control, Communications-Tactical (PEO C3T) will coordinate on technologies to be evaluated with appropriate Program Management offices where there is an opportunity for technology insertion. Technologies that are determined to address technology gaps and require further evaluation will be documented in an acquisition decision memorandum after being approved by the Milestone Decision Authority. The various prototyping technologies will be pursued via competitively awarded contracts using best value source selection procedures.

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army** **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604541A / <i>Unified Network Transport</i>	<b>Project (Number/Name)</b> BT1 / <i>Interoperability</i>
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Product Development (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
TEM (Technical Exchange Meeting) Prototyping and Evaluations	C/FFP	L3Harris Technologies/ Palantir/GDMS : Melbourne, FL/Wash DC/Taunton, MA	-	4.962	Sep 2020	-		-		-		-	0.000	4.962	-
<b>Subtotal</b>			-	4.962		-		-		-		-	0.000	4.962	N/A
<b>Project Cost Totals</b>			-	4.962		0.000		-		-		-	0.000	4.962	N/A

**Remarks**

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**Exhibit R-4, RDT&E Schedule Profile: PB 2022 Army** **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604541A / <i>Unified Network Transport</i>	<b>Project (Number/Name)</b> BT1 / <i>Interoperability</i>
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Event Name	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Industry Innovation Prototyping & Evaluation  <span style="color: red; font-size: small;">Capability Gap Reduction and Enhancement Development Effort</span>																												

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**Exhibit R-4A, RDT&E Schedule Details:** PB 2022 Army **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604541A / <i>Unified Network Transport</i>	<b>Project (Number/Name)</b> BT1 / <i>Interoperability</i>
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Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Industry Innovation Prototyping & Evaluation	4	2020	1	2021

**Note**  
 Technical Exchange Meeting (TEM) projects are continuous activities; Network Cross-Functional Team (N-CFT) and Program Executive Office Command, Control, Communications-Tactical (PEO C3T) will reach out to industry partners in order to assess and demonstrate the latest emerging technologies which will reduce capability gaps and provide rapid software/hardware insertions into Programs of Record.

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**Exhibit R-2A, RDT&E Project Justification:** PB 2022 Army **Date:** May 2021

Appropriation/Budget Activity 2040 / 4					R-1 Program Element (Number/Name) PE 0604541A / Unified Network Transport				Project (Number/Name) BT2 / Command Post Mobility/Survivability			
COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
BT2: <i>Command Post Mobility/Survivability</i>	-	5.322	9.373	8.418	-	8.418	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

Project BT2, Command Post Mobility/Survivability, is directly aligned to the Army Network Modernization Strategy Line of Effort 4 (LOE 4), Command Post Mobility and Survivability. These efforts support advanced component development activities that are directly aligned to the Army's Tactical Network Capability Set development and fielding plans.

This project supports mobile Command Post efforts that may transition to the Command Post Integrated Infrastructure (CPI2) program or other programs that get integrated in CPI2's platforms. The technical maturation and evaluation allow for Command Post disaggregation capabilities to inform future designs. Spectrum obfuscation and assessments of antenna remoting will support the Command Post efforts for CPI2 Increment 1 and beyond.

Fiscal Year (FY) 2022 funds will be used to mature, prototype, and evaluate emerging technologies that will inform design choices for the Command Post Integrated Infrastructure (CPI2) Increment 1 and beyond. Funds also support identification, maturation, demonstration, and evaluation of Technology Readiness Level (TRL) 6+ systems and subsystem components including Cyber Electromagnetic Activities (CEMA) situational understanding and operations Interoperability functions. Successful solutions identified through evaluation in a high fidelity and realistic operating environment will be transitioned to Programs of Record for integration and fielding. Funds will also support integration with solutions identified in the other Modernization Cross Functional Team (CFT) efforts to ensure network dependencies are addressed.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	FY 2020	FY 2021	FY 2022
<b>Title:</b> BT2 Command Post Mobility and Survivability	5.322	9.373	8.418
<b>Description:</b> This funding is used to identify and acquire technologies for evaluation that address gaps associated with LOE 4, Command Post (CP), in the overall Integrated Tactical Network. The CP LOE will focus on developing and obtaining approval of requirements for integrated command posts, then delivering these integrated command post designs to Army units. LOE 4 addresses the operational requirement of Deployable, Integrated, and Mobile Command Post and integrates Knowledge Management.			
<b>FY 2021 Plans:</b> Funds will be used to mature, prototype, and evaluate emerging technologies that will inform design choices for the Command Post Integrated Infrastructure (CPI2) Increment 2 and beyond. Effort includes evaluation for tactically employable Command Post (CP) disaggregation capabilities, will also allow for the integration of spectrum obfuscation modes of employment for limited radio frequency emissions capabilities into a tactically deployable CP and assess antenna remoting solutions, and will enable integration of Mission Partner Environment hardware components into the CP. These efforts will be demonstrated and evaluated			

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army	<b>Date:</b> May 2021
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<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604541A / <i>Unified Network Transport</i>	<b>Project (Number/Name)</b> BT2 / <i>Command Post Mobility/Survivability</i>
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<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
<p>with United States Army Forces Command (FORSCOM) and inform the program technical baseline and Doctrine, Organization, Training, Materiel, Leadership and Education, Personnel, and Facilities (DOTMLPF). Will conduct iterative Technical Exchange Meetings with Industry that will assess, demonstrate, prototype, and integrate emerging industry solutions to mature Command Post capabilities. Efforts will inform the requirements for a survivable and effective mobile Command Post in a contested and congested environment.</p> <p><b><i>FY 2022 Plans:</i></b> Funds will be used to mature, prototype, and evaluate emerging technologies that will inform design choices for the Command Post Integrated Infrastructure (CPI2) Increment 1 and beyond. Effort includes evaluation for tactically employable Command Post (CP) disaggregation capabilities and will also allow for the integration of spectrum obfuscation modes of employment for limited radio frequency emissions capabilities into a tactically deployable CP. Efforts also include assessment of antenna remoting solutions and will enable integration of Mission Partner Environment hardware components into the CP. These efforts will be demonstrated and evaluated with FORSCOM and inform the program technical baseline and DOTMLPF. Technical Exchange Meetings (TEM) with Industry will lead to the assessment, demonstration, prototyping and integration of emerging industry solutions to mature Command Post capabilities. Efforts will inform the requirements for a survivable and effective mobile Command Post in a contested and congested environment.</p> <p><b><i>FY 2021 to FY 2022 Increase/Decrease Statement:</i></b> Decreased requirements associated with transition of funds to align with prioritization of Army Capability Set 23 development and prioritization of science &amp; technology and industry innovation efforts.</p>			
<b>Accomplishments/Planned Programs Subtotals</b>	5.322	9.373	8.418

**C. Other Program Funding Summary (\$ in Millions)**

N/A

**Remarks**

**D. Acquisition Strategy**

The Network Cross-Functional Team (N-CFT) and Program Executive Office Command, Control, Communications-Tactical (PEO C3T) will coordinate on technologies to be evaluated with appropriate Program Management offices where there is an opportunity for technology insertion. Technologies that are determined to address technology gaps and require further evaluation will be documented in an acquisition decision memorandum after being approved by the Milestone Decision Authority. The various evaluations and prototyping of technologies will be pursued via competitively awarded contracts using best value source selection procedures.





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**Exhibit R-4, RDT&E Schedule Profile: PB 2022 Army** **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604541A / <i>Unified Network Transport</i>	<b>Project (Number/Name)</b> BT2 / <i>Command Post Mobility/Survivability</i>
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Event Name	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Survivable Command Post	[Redacted]				[Redacted]																							
Spectrum Obfuscation	[Redacted]				[Redacted]																							
Mobile and Survivable Command Posts (MASCP)	[Redacted]				[Redacted]								[Redacted]															
Industry Innovation Prototyping & Evaluation	[Redacted]				[Redacted]				[Redacted]				[Redacted]															

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**Exhibit R-4A, RDT&E Schedule Details:** PB 2022 Army **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604541A / <i>Unified Network Transport</i>	<b>Project (Number/Name)</b> BT2 / <i>Command Post Mobility/Survivability</i>
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Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Survivable Command Post	2	2020	4	2022
Spectrum Obfuscation	2	2020	4	2022
Mobile and Survivable Command Posts (MASCP)	1	2023	1	2028
Industry Innovation Prototyping & Evaluation	4	2020	1	2026

**Note**

Industry Innovation Prototyping and Evaluation projects are awarded following Technical Exchange Meetings (TEM) and are continuous activities; Network Cross-Functional Team (N-CFT) and Program Executive Office Command, Control, Communications-Tactical (PEO C3T) will reach out to industry partners in order to assess and demonstrate the latest emerging technologies which will reduce capability gaps and provide rapid software/hardware insertions into Programs of Records.

Changes from PB21 Schedule:

- TEM (Technical Exchange Meeting) Prototyping and Evaluations have been retitled as Industry Innovation Prototyping & Evaluation
- Science and Technology (S&T) projects are evaluated based on ongoing forums with the S&T community. N-CFT and PEO C3T track changes to the S&T efforts, including but not limited to, titles, descriptions, Technology Readiness Level (TRL), planned program transition and transfer agreement status. N-CFT and PEO C3T utilizes this information to prioritize the S&T projects by fiscal year.
- Node to Node Connectivity Solutions is included in the Survivable Command Post project and was eliminated as an individual effort in the schedule.
- Warfighting Assessments - Mission Partner Environment (MPE)/Network Operations was removed as Warfighting Assessments will be determined on a case by case based on each S&T project.
- Spectrum Obfuscation, previously captured on funding project BT5, Integrated Tactical Network/Integrated Enterprise Network, is now captured on BT2, Command Post Mobility/Survivability, schedule.
- Mobile and Survivable Command Posts (MASCP) has been identified as a project planned to start in FY23.

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army										<b>Date:</b> May 2021		
<b>Appropriation/Budget Activity</b> 2040 / 4					<b>R-1 Program Element (Number/Name)</b> PE 0604541A / <i>Unified Network Transport</i>				<b>Project (Number/Name)</b> BT3 / <i>Common Operating Environment (COE)</i>			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022 Base</b>	<b>FY 2022 OCO</b>	<b>FY 2022 Total</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>FY 2026</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
BT3: <i>Common Operating Environment (COE)</i>	-	4.171	7.866	7.069	-	7.069	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

Project BT3, Common Operating Environment (COE), is directly aligned to the Army Network Modernization Strategy Line of Effort 2 (LOE 2), Common Operating Environment (COE). These efforts support advanced component development activities that are aligned to the Army's Tactical Network Capability Set development and fielding plans.

This project will inform future network, applications and data capability sets by evaluating and maturing the use of cloud technologies, virtual augmentation, artificial intelligence, data convergence and analytics in the Common Operating Environment. This includes processing and storage to improve the architecture support for mobile, secure and distributed operations. Common Operating Environment (COE), creates an approved set of standards, computing technologies, integrated data and databases, common graphics and a unified set of mission command applications. It allows warfighters to adapt and configure the network as conditions change which is outlined in the approved COE requirements documents.

Fiscal Year (FY) 2022 funds will be used to mature technologies to assess and evaluate the technical feasibility of solutions for expanded computing in tactical environments, data convergence, sensor integration across identified platforms, and flexible and scalable computing hardware/software. Funds will also support identification, maturation, demonstration, and evaluation of Technology Readiness Level (TRL) 6+ systems and subsystem components including Cyber Electromagnetic Activities (CEMA) situational understanding and operations Interoperability functions. Successful solutions identified through evaluation in a high fidelity and realistic operating environment will be transitioned to Programs of Record for integration and fielding. Funds will also support integration with solutions identified in the other Modernization Cross-Functional Team (CFT) efforts to ensure network dependencies are addressed.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
<b>Title:</b> BT3 Common Operating Environment	4.171	7.866	7.069
<b>Description:</b> This funding is used to identify and acquire technologies to address gaps associated with LOE 2, Common Operating Environment (COE), in the overall Integrated Network. This LOE creates an approved set of standards, computing technologies, integrated data and databases and common graphics and a unified set of mission command applications. It will also support collaboration using a common picture with joint and coalition mission partners. This LOE delivers an integrated body of requirements that meet operational needs.			
<b>FY 2021 Plans:</b>			

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604541A / <i>Unified Network Transport</i>	<b>Project (Number/Name)</b> BT3 / <i>Common Operating Environment (COE)</i>

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
<p>Will support evaluation of mature technologies that capture, correlate, and present data from available sources such as spectrum, electronic warfare (EW), red and gray space for visualization for cyber situational understanding. Will assess and evaluate the technical feasibility of solutions for expanded computing in tactical environments, data convergence, sensor integration across identified platforms, and flexible and scalable computing hardware/software. Will enable commanders to visualize, understand, describe, and assess complex problems rapidly. Will conduct iterative Technical Exchange Meetings to find Industry potential solutions to assess, demonstrate, prototype, and integrate emerging industry solutions to mature Common Operating Environment capabilities.</p> <p><b><i>FY 2022 Plans:</i></b> Funds will be used to mature technologies that capture, correlate, and present data from available sources such as spectrum, electronic warfare (EW), red and gray space for visualization for cyber situational understanding. Funds will also be used to evaluate the technical feasibility of solutions for expanded computing in tactical environments, data convergence, sensor integration across identified platforms, and flexible and scalable computing hardware/software as well as efforts with Industry partners resulting from Technical Exchange Meetings that will lead to potential solutions to assess, demonstrate, prototype, and integrate emerging industry solutions to mature Common Operating Environment capabilities.</p> <p><b><i>FY 2021 to FY 2022 Increase/Decrease Statement:</i></b> Decreased requirements associated with transition of funds to align with prioritization of Army Capability Set 23 development and prioritization of science &amp; technology and industry innovation efforts.</p>			
<b>Accomplishments/Planned Programs Subtotals</b>	4.171	7.866	7.069

**C. Other Program Funding Summary (\$ in Millions)**

N/A

**Remarks**

**D. Acquisition Strategy**

The Network Cross-Functional Team (N-CFT) and Program Executive Office Command, Control, Communications-Tactical (PEO C3T) will coordinate on technologies to be evaluated with appropriate Program Management offices where there is an opportunity for technology insertion. Technologies that are determined to address technology gaps and require further evaluation will be documented in an acquisition decision memorandum after being approved by the Milestone Decision Authority. The prototyping technologies in this project will be pursued via competitively awarded contracts using best value source selection procedures.



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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2022 Army</b>		<b>Date: May 2021</b>
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604541A / <i>Unified Network Transport</i>	<b>Project (Number/Name)</b> BT3 / <i>Common Operating Environment (COE)</i>

Event Name	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Cyber Situational Understanding																												
Spectrum Awareness																												
Hardened Transport																												
Convergence Tools for Tactical Environments & Commander's Visualization																												
ERASe/RainMaker																												
Information Trust																												
Autonomous Cyber																												
Industry Innovation Prototyping & Evaluation																												

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604541A / <i>Unified Network Transport</i>	<b>Project (Number/Name)</b> BT3 / <i>Common Operating Environment (COE)</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Cyber Situational Understanding	2	2020	1	2022
Spectrum Awareness	2	2020	2	2021
Hardened Transport	4	2020	1	2021
Convergence Tools for Tactical Environments & Commander's Visualization	1	2022	1	2026
ERASe/RainMaker	1	2023	1	2024
Information Trust	1	2023	2	2025
Autonomous Cyber	2	2023	1	2026
Industry Innovation Prototyping & Evaluation	4	2020	1	2026

**Note**

Industry Innovation Prototyping and Evaluation projects are awarded following Technical Exchange Meetings (TEM) and are continuous activities; Network Cross-Functional Team (N-CFT) and Program Executive Office Command, Control, Communications-Tactical (PEO C3T) will reach out to industry partners in order to assess and demonstrate the latest emerging technologies which will reduce capability gaps and provide rapid software/hardware insertions into Programs of Record.

Changes from PB21 Schedule:

- TEM (Technical Exchange Meeting) Prototyping and Evaluations have been retitled as Industry Innovation Prototyping & Evaluation
- Science and Technology (S&T) projects are evaluated based on ongoing forums with the S&T community. N-CFT and PEO C3T track changes to the S&T efforts, including but not limited to - titles, descriptions, Technology Readiness Level (TRL), planned program transition and transfer agreement status. N-CFT and PEO C3T utilizes this information to prioritize the S&T projects by fiscal year.
- Cyber Situational Understanding and Spectrum Awareness were identified as having high TRLs and ready for a FY20 start and transition to RDT&E 6.4 funding in support of future Capability Set development and fielding.
- Every Receiver A Sensor (ERASe)/Rainmaker is expected to have a high TRL by FY23 to support a start and transition to RDT&E 6.4 funding in support of future Capability Set development and fielding.
- Hardened Transport was identified as an industry innovation and awarded in FY20
- Information Trust, previously captured under funding project BT5, Integrated Tactical Network/Enterprise Network, schedule is now captured under BT3, Common Operating Environment (COE).

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604541A / <i>Unified Network Transport</i>	<b>Project (Number/Name)</b> BT3 / <i>Common Operating Environment (COE)</i>
<p>- Autonomous Cyber, previously captured under funding project BT5, Integrated Tactical Network/Enterprise Network, schedule is now captured under BT3, Common Operating Environment (COE).</p> <p>- Convergence Tools for Tactical Environments &amp; Commander's Visualization have been included to address emerging Common Operating Environment (COE) requirements.</p>		



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**Exhibit R-2A, RDT&E Project Justification:** PB 2022 Army **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4					<b>R-1 Program Element (Number/Name)</b> PE 0604541A / <i>Unified Network Transport</i>				<b>Project (Number/Name)</b> BT4 / <i>Network Technology Maturation Initiatives (NTMI)</i>			
COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
BT4: <i>Network Technology Maturation Initiatives (NTMI)</i>	-	2.301	-	-	-	-	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

Project BT4, Network Technology Maturation Initiatives (NTMI), is directly aligned to the Army Network Modernization Strategy Lines of Effort (LOE) and Capability Set 23 objectives.

This project funding will mature solutions through evaluation from non-Army organizations that include the Services, Academia and other science and technology organizations. The lab-based and operational field evaluation and assessments will support the Army's use of technologies to support Joint collaboration and coordination of transport, network and data classification, visualization for Situational Understanding, Cyber Electromagnetic Activities (CEMA), and artificial intelligence for Capability Set 23. This includes evaluation and prototyping of mature algorithms/systems to support Joint and Coalition data sharing for Mission Command/Intel convergence, sensor to shooter cycles and Joint Multi-Domain Command and Control.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	FY 2020	FY 2021	FY 2022
<b>Title:</b> BT4: Network Technology Maturation Initiatives (NTMI)	2.301	-	-
<b>Description:</b> This funding will be used to continuously identify, prioritize, mature, demonstrate, and insert emerging technologies to enhance operational capability through our Market Research and Concept Capability Development activities. Funding provides engineering and programmatic support required for execution of lab-based and field prototyping and evaluation.			
<b>Accomplishments/Planned Programs Subtotals</b>	2.301	-	-

**C. Other Program Funding Summary (\$ in Millions)**

N/A

**Remarks**

**D. Acquisition Strategy**

The various evaluations and prototyping of technologies will be pursued via competitively awarded contracts using best value source selection procedures.

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army** **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604541A / <i>Unified Network Transport</i>	<b>Project (Number/Name)</b> BT4 / <i>Network Technology Maturation Initiatives (NTMI)</i>
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<b>Management Services (\$ in Millions)</b>				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Program Support	MIPR	Acquisition Contracting Center : APG, MD	-	0.263	Apr 2020	-		-		-		-	0.000	0.263	-
<b>Subtotal</b>			-	0.263		-		-		-		-	0.000	0.263	N/A

<b>Product Development (\$ in Millions)</b>				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Industry Innovaton Prototyping & Evaluation	TBD	GDMS/Palantir : Taunton, MA/Wash DC	-	2.038	Sep 2020	-		-		-		-	0.000	2.038	-
<b>Subtotal</b>			-	2.038		-		-		-		-	0.000	2.038	N/A

			Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
<b>Project Cost Totals</b>			-	2.301	0.000	-	-	-	0.000	2.301	N/A

**Remarks**

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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2022 Army</b>			<b>Date: May 2021</b>
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604541A / <i>Unified Network Transport</i>	<b>Project (Number/Name)</b> BT4 / <i>Network Technology Maturation Initiatives (NTMI)</i>	

Event Name	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Industry Innovation Prototyping & Evaluation																												

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604541A / <i>Unified Network Transport</i>	<b>Project (Number/Name)</b> BT4 / <i>Network Technology Maturation Initiatives (NTMI)</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Industry Innovation Prototyping & Evaluation	4	2020	1	2021

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army										<b>Date:</b> May 2021		
<b>Appropriation/Budget Activity</b> 2040 / 4					<b>R-1 Program Element (Number/Name)</b> PE 0604541A / <i>Unified Network Transport</i>				<b>Project (Number/Name)</b> BT5 / <i>Integrated Tactical Network/Enterprise Network</i>			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022 Base</b>	<b>FY 2022 OCO</b>	<b>FY 2022 Total</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>FY 2026</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
BT5: <i>Integrated Tactical Network/Enterprise Network</i>	-	11.722	21.953	19.922	-	19.922	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

Project BT5, Integrated Tactical Network/Enterprise Network (ITN/IEN), is directly aligned to the Army Network Modernization Strategy lines of effort 1 (LOE 1) Unified Network. These efforts support advanced component development activities that are aligned to the Army's Tactical Network Capability Set development and fielding plans.

This project enables a converged Mission Command Network that operates seamlessly worldwide and in any environment. It includes the development of a standards-based network architecture that unifies enterprise and deployed network capabilities and features a unified transport layer, network operations and other enabling functions that allows integration of disparate networks. The Army network will provide resiliency through path diversity and dynamic routing to ensure tactical units can communicate in hostile environments. It will provide multiple ways to communicate and give commanders the ability to choose their communications methods and tools during operations. It fully incorporates cyber and electronic warfare capabilities that support the employment of the network as a weapon system. The Army ITN/IEN provides the ground domain network connectivity of Joint All Domain Command and Control (JADC2) and enables Unified Action Partner interoperability through integration with the Mission Partner Environment (MPE). Interoperability is the ability to routinely act together coherently, effectively and efficiently to achieve tactical, operational, and strategic objectives. Interoperability between disparate forces allows coalitions to produce greater combat power than the sum of their parts by leveraging relative strengths while mitigating relative weaknesses.

Fiscal Year (FY) 2022 funding will be used to inform design decisions for future tactical network capability sets in the areas of Aerial Tier, protected communications satellite capabilities, cyber hardened communications, and resilient Line of Site (LOS) and beyond Line of Sight (BLOS) waveforms through evaluation and technical maturation. Funds also support identification, maturation, demonstration, and evaluation of Technology Readiness Level (TRL) 6+ systems and subsystem components including Cyber Electromagnetic Activities (CEMA) situational understanding and operations Interoperability functions. Successful solutions identified through evaluation in a high fidelity and realistic operating environment will be transitioned to Programs of Record for integration and fielding. Funds will also support integration with solutions identified in the other Modernization Cross Functional Team (CFT) efforts to ensure network dependencies are addressed.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
<b>Title:</b> Project BT5: Integrated Tactical Network/Integrated Enterprise Network	11.722	21.953	19.922
<b>Description:</b> This funding is used to identify and acquire technologies to address gaps associated with LOE 1, Unified Network, for evaluation and demonstration in the overall Integrated Network. The Unified Network LOE enables a converged Mission Command Network that operates seamlessly worldwide and in any environment. This will require the creation of a standards-based network architecture that effectively integrates enterprise and deployed network capabilities across domains and			

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604541A / <i>Unified Network Transport</i>	<b>Project (Number/Name)</b> BT5 / <i>Integrated Tactical Network/Enterprise Network</i>

**B. Accomplishments/Planned Programs (\$ in Millions)**

environments, and features a unified transport layer that permits "plug and play" for specific network capabilities. LOE 1 addresses the following operational requirements: Converged Mission Command Network, Network Augmentation / Extension, and Synthetic Training Environment.

***FY 2021 Plans:***

Will prototype and evaluate Army science and technology solutions in order to support approved requirements documents and critical network modernization efforts to accelerate Next Generation Tactical radios, Air to ground integration, Secure LTE capabilities for mounted/ dismounted soldiers and solutions for a hardened, resilient network. Will evaluate artificial intelligence and other advanced solutions for communications network processing, transport, and operations to support resiliency in a contested and congested environment. This includes evaluating and prototyping with emerging technology solutions for communications for tactical and strategic Army assets in satellite denied, area denied environments and increase immunity to enemy detection and interception. Funding will allow the Army to identify and prototype solutions to mature the network transport and gateway components of the Mission Partner Environment (MPE) and share network operations information through warfighting assessments and evaluations that will inform Capability Set 23 and beyond. Will conduct iterative Technical Exchange Meetings with Industry and non-Army organizations such as other Services, DARPA, NSA, OSD, FFRDs, and Academia to assess, demonstrate, prototype, and integrate emerging industry solutions to mature unified network capabilities to include integration of government and commercial Low Earth Orbit (LEO), Mid Earth Orbit (MEO) and Geosynchronous Earth Orbit (GEO) high throughput satellite communications. Will reduce capability gaps and provide rapid software/hardware insertions for Programs of Record. These efforts directly support the Army's tactical network acquisition strategy roadmap submitted to Congress.

***FY 2022 Plans:***

Funds will be used for science and technology evaluation and prototyping solutions to support approved requirements documents and critical network modernization efforts to accelerate Next Generation Tactical radios, Air to ground integration, Secure LTE capabilities for mounted/ dismounted soldiers and solutions for a hardened, resilient network. Efforts will include evaluation of artificial intelligence and other advanced solutions for communications network processing, transport, and operations to support resiliency in a contested and congested environment. Funding will allow the Army to identify and prototype solutions to mature the network transport and gateway components of the Mission Partner Environment (MPE) and share network operations information through warfighting assessments and evaluations that will inform Capability Set 23 and beyond. Funds will also be used for innovative industry prototyping and evaluation effort associated with Technical Exchange Meetings to assess, demonstrate, prototype, and integrate emerging industry solutions to mature unified network capabilities to include integration of government and commercial Low Earth Orbit (LEO), Mid Earth Orbit (MEO) and Geosynchronous Earth Orbit (GEO) high throughput satellite communications. These efforts directly support the Army's tactical network acquisition strategy roadmap submitted to Congress.

***FY 2021 to FY 2022 Increase/Decrease Statement:***

<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604541A / <i>Unified Network Transport</i>	<b>Project (Number/Name)</b> BT5 / <i>Integrated Tactical Network/Enterprise Network</i>

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
Decreased requirements associated with transition of funds to align with prioritization of Army Capability Set 23 development and prioritization of science & technology and industry innovation efforts.			
<b>Accomplishments/Planned Programs Subtotals</b>	11.722	21.953	19.922

**C. Other Program Funding Summary (\$ in Millions)**

N/A

**Remarks**

**D. Acquisition Strategy**

The Network Cross-Functional Team (N-CFT) and Program Executive Office Command, Control, Communications-Tactical (PEO C3T) will coordinate on technologies to be evaluated with appropriate Program Management offices where there is an opportunity for technology insertion. Technologies that are determined to address technology gaps and require further evaluation will be documented in an acquisition decision memorandum after being approved by the Milestone Decision Authority. The various prototyping programs in this project will be pursued via competitively awarded contracts using best value source selection procedures.

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army** **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604541A / <i>Unified Network Transport</i>	<b>Project (Number/Name)</b> BT5 / <i>Integrated Tactical Network/Enterprise Network</i>
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<b>Management Services (\$ in Millions)</b>				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Project Management Office Support	MIPR	Acquisition Contracting Center : APG MD	-	-		0.090	Nov 2020	0.209	Nov 2021	-		0.209	0.000	0.299	-
<b>Subtotal</b>			-	-		0.090		0.209		-		0.209	0.000	0.299	N/A

<b>Product Development (\$ in Millions)</b>				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Science & Technology - Soldier Authentication	Various	CCDC/FlexTech Alliance : APG, MD	-	2.000	Apr 2020	2.000	Nov 2020	-		-		-	0.000	4.000	-
Science & Technology - INB2	Various	CodeMettle : Atlanta, GA	-	4.021	Mar 2020	3.900	Nov 2020	-		-		-	0.000	7.921	-
Science & Technology - AppSecC	MIPR	CCDC : APG, MD	-	2.800	Mar 2020	-		-		-		-	0.000	2.800	-
Science & Technology - TSM IC	Various	CCDC/BAH/CACI : APG, MD/Mclean, VA/Arlington, VA	-	1.008	Aug 2020	-		-		-		-	0.000	1.008	-
Science & Technology (S&T) Maturation Prototyping & Evaluation	TBD	CACI/CodeMettle/BAH : APG MD/Atlanta GA/APG MD	-	-		10.875	Dec 2020	15.200	Nov 2021	-		15.200	0.000	26.075	-
Industry Innovation - C4ISR Open Suite of Standards	TBD	Spectranetix Inc : Sunnyvale CA	-	1.602		-		-		-		-	0.000	1.602	-
Industry Innovation Prototyping & Evaluation	TBD	TBD : TBD	-	0.291		5.088	Feb 2021	4.513	Feb 2022	-		4.513	0.000	9.892	-
<b>Subtotal</b>			-	11.722		21.863		19.713		-		19.713	0.000	53.298	N/A

	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract	
<b>Project Cost Totals</b>		-	11.722	21.953	19.922	-	19.922	0.000	53.597	N/A



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<b>Exhibit R-3, RDT&amp;E Project Cost Analysis:</b> PB 2022 Army							<b>Date:</b> May 2021			
<b>Appropriation/Budget Activity</b> 2040 / 4			<b>R-1 Program Element (Number/Name)</b> PE 0604541A / <i>Unified Network Transport</i>			<b>Project (Number/Name)</b> BT5 / <i>Integrated Tactical Network/Enterprise Network</i>				
	<b>Prior Years</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022 Base</b>	<b>FY 2022 OCO</b>	<b>FY 2022 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>	

**Remarks**  
 FY22 change in distribution of funding based on planned transition of Science & Technology projects from Budget Activity )BA) 6.3 to BA 6.4.

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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2022 Army</b>		<b>Date: May 2021</b>
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604541A / <i>Unified Network Transport</i>	<b>Project (Number/Name)</b> BT5 / <i>Integrated Tactical Network/Enterprise Network</i>

Event Name	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Application Security with Containers (AppSec-C)																												
Integrated Network Operations Battalion and Below (INB2)																												
Tactical Scalable Mobile Ad-hoc Networking (MANET) Interference Cancellation																												
Tactical IdAM – Soldier Authentication																												
C4ISR/EW Modular Open Suite of Standards (CMOSS)																												
Protected Comms for Manned-unmanned teaming (MUM-T)																												
Next Generation High Frequency (NGHF)																												
Non-traditional Waveforms																												
CMOSS Mounted Form Factor (CMFF)																												
WGS Ka Band Surrogate																												
Aerial Tier Networking																												
Narrowband SATCOM																												
Protected SATCOM																												

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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2022 Army</b>		<b>Date: May 2021</b>
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604541A / <i>Unified Network Transport</i>	<b>Project (Number/Name)</b> BT5 / <i>Integrated Tactical Network/Enterprise Network</i>

Event Name	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
GRiD (Geospatial Repository & Data Management) Tactical																												
Modular RF																												
Industry Innovation Prototyping & Evaluation																												

**UNCLASSIFIED**

<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604541A / <i>Unified Network Transport</i>	<b>Project (Number/Name)</b> BT5 / <i>Integrated Tactical Network/Enterprise Network</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Application Security with Containers (AppSec-C)	2	2020	2	2021
Integrated Network Operations Battalion and Below (INB2)	2	2020	1	2022
Tactical Scalable Mobile Ad-hoc Networking (MANET) Interference Cancellation	4	2020	2	2021
Tactical IdAM -- Soldier Authentication	2	2020	4	2022
C4ISR/EW Modular Open Suite of Standards (CMOSS)	4	2020	1	2021
Protected Comms for Manned-unmanned teaming (MUM-T)	1	2021	1	2023
Next Generation High Frequency (NGHF)	1	2021	1	2024
Non-traditional Waveforms	1	2021	1	2026
CMOSS Mounted Form Factor (CMFF)	2	2021	1	2022
WGS Ka Band Surrogate	1	2022	1	2023
Aerial Tier Networking	1	2022	1	2024
Narrowband SATCOM	1	2022	1	2024
Protected SATCOM	1	2022	1	2026
GRiD (Geospatial Repository & Data Management) Tactical	2	2022	3	2025
Modular RF	1	2024	1	2025
Industry Innovation Prototyping & Evaluation	4	2020	1	2026

**Note**

Industry Innovation Prototyping and Evaluation projects are awarded following Technical Exchange Meetings (TEM) and are continuous activities; Network Cross-Functional Team (N-CFT) and Program Executive Office Command, Control, Communications-Tactical (PEO C3T) will reach out to industry partners in order to assess and demonstrate the latest emerging technologies which will reduce capability gaps and provide rapid software/hardware insertions into Programs of Record.

Changes from PB21 Schedule:

- TEM (Technical Exchange Meeting) Prototyping and Evaluations have been retitled as Industry Innovation Prototyping & Evaluation

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<b>Exhibit R-4A, RDT&amp;E Schedule Details: PB 2022 Army</b>		<b>Date: May 2021</b>
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604541A / <i>Unified Network Transport</i>	<b>Project (Number/Name)</b> BT5 / <i>Integrated Tactical Network/Enterprise Network</i>
<ul style="list-style-type: none"> <li>- Science and Technology (S&amp;T) projects are evaluated based on ongoing forums with the S&amp;T community. N-CFT and PEO C3T track changes to the S&amp;T efforts, including but not limited to - titles, descriptions, Technology Readiness Level (TRL), planned program transition and transfer agreement status. N-CFT and PEO C3T utilizes this information to prioritize the S&amp;T projects by fiscal year.</li> <li>- Spectrum Obfuscation, previously captured on BT5, Integrated Tactical Network/Enterprise Network schedule, is now captured under funding project BT2, Command Post Mobility/Survivability.</li> <li>- Information Trust, previously captured on BT5 schedule, is now captured under funding project BT3, Common Operating Environment (COE).</li> <li>- Autonomous Cyber, previously captured under funding project BT5, Integrated Tactical Network/Enterprise Network, schedule is now captured under BT3, Common Operating Environment (COE).</li> <li>- Projects Integrated Network Operations Battalion and Below (INB2), Tactical Identify Access Management (IdAM)-Soldier Authentication and Tactical Scalable Mobile Ad-hoc Networking (MANET) Interference Cancellation (TSM IC) were identified as having high Technology Readiness Level (TRLs) and ready for a FY20 start; ready for transition to RDT&amp;E 6.4 funding in support of future Capability Set development and fielding.</li> <li>- C4ISR/EW Modular Open Suite of Standards (CMOSS) Mounted Form Factor (CMFF) was identified as having a high TRL and ready for a FY21 start; ready for transition to RDT&amp;E 6.4 funding in support of future Capability Set development and fielding.</li> <li>- Geospatial Repository &amp; Data Management (GRiD) Tactical is expected to have a high TRL by FY22 to support a start and transition to RDT&amp;E 6.4 funding in support of future Capability Set development and fielding.</li> <li>- Modular RF is expected to have a high TRL by FY24 to support a start and transition to RDT&amp;E 6.4 funding in support of future Capability Set development and fielding.</li> <li>- CMOSS was identified as an industry innovation and awarded in FY20.</li> </ul>		

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2022 Army **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040: <i>Research, Development, Test &amp; Evaluation, Army / BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0604644A / <i>Mobile Medium Range Missile</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	-	4.794	88.100	286.457	-	286.457	-	-	-	-	-	-
MR1: <i>Mobile Intermediate Range Missile</i>	-	4.794	88.100	286.457	-	286.457	-	-	-	-	-	-

**A. Mission Description and Budget Item Justification**

The Program Element (PE) 0604644A / Mobile Medium Range Missile funds the US Army Rapid Capabilities and Critical Technologies Office (RCCTO) Mid-Range Capability (MRC) effort and continues as the program transitions to the US Army Program Executive Office Missiles and Space (PEO MS). Four MRC batteries will be developed and deployed; the MRC prototype battery will be developed by RCCTO, and the three remaining MRC batteries by PEO MS. The mission of the MRC project is to provide Combatant Commanders with a strategic, ground-mobile, all-weather, offensive missile capability. The MRC Project will leverage existing SM-6 and Tomahawk missiles for ground launch, to provide a responsive, highly accurate, deep strike capability designed to destroy high value, high payoff targets. MRC is optimized for the penetration/dis-integration phase of Multi-Domain Operations (MDO) by defeating enemy Anti-Access / Area Denial (A2/AD) systems allowing the Joint Force Commander freedom to maneuver during the exploitation phase.

The MRC project leverages Joint Service technologies and integration of common hardware, software, and mutually supporting test events. MRC develops the Launchers and Battery Operations Center (BOC) which provide the capability to fire a mix of missiles capable of flying at various speeds and altitudes for mid-range distances to engage desired targets. The MRC project deliverable quantity is one residual combat MRC prototype battery consisting of four Launchers and one BOC, to be deployed NLT 4Q FY 2023 as the First Unit of Issue (FUI).

FY 2022 Base funding in the amount of \$286.457 million for Project MR1 funds the integration of design requirements to deploy the prototype battery. Base funding allows for integration and evaluation of required characteristics to ensure safe and effective operational deployment of the prototype battery. Base funding also allows for purchasing and receiving hardware and materials to implement prototype fabrication, and to support component-level and system-level qualification.

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2022 Army	<b>Date:</b> May 2021
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<b>Appropriation/Budget Activity</b> 2040: <i>Research, Development, Test &amp; Evaluation, Army / BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0604644A / <i>Mobile Medium Range Missile</i>
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<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022 Base</b>	<b>FY 2022 OCO</b>	<b>FY 2022 Total</b>
Previous President's Budget	5.000	0.000	0.000	-	0.000
Current President's Budget	4.794	88.100	286.457	-	286.457
Total Adjustments	-0.206	88.100	286.457	-	286.457
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	88.100			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.206	-			
• Adjustments to Budget Years	-	-	286.457	-	286.457

**Change Summary Explanation**

FY 2022 Base funding provides for the continuation of the design activities from FY 2021, completes the prototype fabrication of the Battery Operations Center and four Launchers and associated equipment. FY 2022 Base funding will support integration and test activities for system qualification. Additionally, FY 2022 Base funding includes the funding required for the Tomahawk missiles for the prototype battery.

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army										<b>Date:</b> May 2021		
<b>Appropriation/Budget Activity</b> 2040 / 4					<b>R-1 Program Element (Number/Name)</b> PE 0604644A / <i>Mobile Medium Range Missile</i>				<b>Project (Number/Name)</b> MR1 / <i>Mobile Intermediate Range Missile</i>			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022 Base</b>	<b>FY 2022 OCO</b>	<b>FY 2022 Total</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>FY 2026</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
MR1: <i>Mobile Intermediate Range Missile</i>	-	4.794	88.100	286.457	-	286.457	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

The Program Element (PE) 0604644A / Mobile Medium Range Missile funds the US Army Rapid Capabilities and Critical Technologies Office (RCCTO) Mid-Range Capability (MRC) effort and continues as the program transitions to the US Army Program Executive Office Missiles and Space (PEO MS). Four MRC batteries will be developed and deployed; the MRC prototype battery will be developed by RCCTO, and the three remaining MRC batteries by PEO MS. The mission of the MRC project is to provide Combatant Commanders with a strategic, ground-mobile, all-weather, offensive missile capability. The MRC Project will leverage existing SM-6 and Tomahawk missiles for ground launch, to provide a responsive, highly accurate, deep strike capability designed to destroy high value, high payoff targets. MRC is optimized for the penetration/dis-integration phase of Multi-Domain Operations (MDO) by defeating enemy Anti-Access / Area Denial (A2/AD) systems allowing the Joint Force Commander freedom to maneuver during the exploitation phase.

The MRC project leverages Joint Service technologies and integration of common hardware, software, and mutually supporting test events. MRC develops the Launchers and Battery Operations Center (BOC) which provide the capability to fire a mix of missiles capable of flying at various speeds and altitudes for mid-range distances to engage desired targets. The MRC project deliverable quantity is one residual combat MRC prototype battery consisting of four Launchers and one BOC, to be deployed NLT 4Q FY 2023 as the First Unit of Issue (FUI).

FY 2022 Base funding in the amount of \$286.457 million for Project MR1 funds the integration of design requirements to deploy the prototype battery. Base funding allows for integration and evaluation of required characteristics to ensure safe and effective operational deployment of the prototype battery. Base funding also allows for purchasing and receiving hardware and materials to implement prototype fabrication, and to support component-level and system-level qualification.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
<b>Title:</b> Mobile Intermediate Range Missile (MIRM)	4.794	88.100	-
<b>Description:</b> The Program Element (PE) 0604644A / Mobile Medium Range Missile funds the US Army Rapid Capabilities and Critical Technologies Office (RCCTO) Mid-Range Capability (MRC) effort and continues as the program transitions to the US Army Program Executive Office Missiles and Space (PEO MS). Four MRC batteries will be developed and deployed; the MRC prototype battery will be developed by RCCTO, and the three remaining MRC batteries by PEO MS. The mission of the MRC project is to provide Combatant Commanders with a strategic, ground-mobile, all-weather, offensive missile capability. The MRC Project will leverage existing SM-6 and Tomahawk missiles for ground launch, to provide a responsive, highly accurate, deep strike capability designed to destroy high value, high payoff targets. MRC is optimized for the penetration/dis-integration phase			



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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army		<b>Date:</b> May 2021		
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604644A / <i>Mobile Medium Range Missile</i>	<b>Project (Number/Name)</b> MR1 / <i>Mobile Intermediate Range Missile</i>		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
<p>of Multi-Domain Operations (MDO) by defeating enemy Anti-Access / Area Denial (A2/AD) systems allowing the Joint Force Commander freedom to maneuver during the exploitation phase.</p> <p>The MRC project leverages Joint Service technologies and integration of common hardware, software, and mutually supporting test events. MRC develops the Launchers and Battery Operations Center (BOC) which provide the capability to fire a mix of missiles capable of flying at various speeds and altitudes for mid-range distances to engage desired targets. The MRC project deliverable quantity is one residual combat MRC prototype battery consisting of four Launchers and one BOC, to be deployed NLT 4Q FY 2023 as the First Unit of Issue (FUI).</p> <p>The MRC Launcher Payload Deployment System project leverages Joint Service technologies and integration of common hardware, software, and mutually supporting test events for the MRC Payload Deployment System. MRC Launcher PDS stows and fires the two missiles, SM-6 and Tomahawk. The missiles are capable of flying at various speeds and altitudes for mid-range distances to engage desired targets. The MRC Launcher PDS Project delivers four PDSs for each MRC Battery.</p> <p>The MRC Ground Support Equipment project leverages Joint Service technologies and integration of common hardware, software, and mutually supporting test events for the Ground Support Equipment. The Ground Support Equipment includes the Battery Operations Center, prime movers, trailer, generators, cabling, and support vehicles.</p> <p>The MRC Missiles project funds Joint Service technologies and buys missiles, SM-6 and Tomahawk, needed for the operational deployment of the MRC prototype Battery. The missiles are capable of flying at various speeds and altitudes for mid-range distances to engage desired targets.</p> <p><b>FY 2021 Plans:</b> This funds hardware and material, manufacturing, assembly, test, integration and checkout for the four prototype MRC launchers, and also funds hardware and material, manufacturing, assembly, test, integration, and checkout of the BOC Test Bed and the BOC prototype asset.</p> <p><b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> In PB 21 R Form all costs in FY 2020 and FY 2021 were captured under MIRM. For PB 22 R Form additional program details were added.</p>				
<p><b>Title:</b> Mid-Range Capability (MRC) Launcher Payload Deployment System (PDS)</p> <p><b>Description:</b> The MRC Launcher PDS leverages Joint Service technologies and integration of common hardware, software, and mutually supporting test events for the MRC Payload Deployment System. The MRC Launcher PDS stows and fires SM-6 and</p>		-	-	46.490

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604644A / <i>Mobile Medium Range Missile</i>	<b>Project (Number/Name)</b> MR1 / <i>Mobile Intermediate Range Missile</i>

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
<p>Tomahawk missiles. The missiles are capable of flying at various speeds and altitudes for mid-range distances to engage desired targets. The MRC Launcher PDS Project delivers four PDSs for each MRC Battery.</p> <p><b>FY 2022 Plans:</b> The FY 2022 Base funding in the amount of \$46.490 million funds the fabrication, integration of design requirements, and test and evaluation for the four MRC Launcher PDS Base funding ensures safe and effective operational deployment of the MRC prototype PDS. This funds the OEMs effort to obtain materials and sub-assemblies and to fabricate the MRC Launcher Payload Deployment System. This effort completes the design, development, and integration of required characteristics to ensure safe and effective operational deployment of the MRC Launcher PDS solution. Launcher integration ensures that the system is stable during launch and meets transportation requirements. Provides for the Government and Contractor coordination required to participate and plan for initial Test and Evaluation events. Integration efforts include wireless communication, rapid reloading, improved mobility, weight reduction, and M-Code implementation. Provides Government Program Management, Systems Engineering, SETA support, and technical control for the MRC Launcher PDS project.</p> <p><b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> Funding will provide all remaining material requirements as the majority of the fabrication of the four Launcher prototypes continues. In PB 21 R Form all costs in FY 2020 and FY 2021 were captured under MIRM. For PB 22 R Form additional program details were added.</p>			
<p><b>Title:</b> Mid-Range Capability (MRC) Ground Support Equipment (GSE)</p> <p><b>Description:</b> The MRC Ground Support Equipment leverages Joint Service technologies and integration of common hardware, software, and mutually supporting test events for the GSE. This includes the Battery Operations Center, prime movers, trailer, generators, cabling, and support vehicles. The MRC Battery Operations Center houses the federated Command and Control systems.</p> <p><b>FY 2022 Plans:</b> The FY 2022 Base funding in the amount of \$100.226 million funds the fabrication, integration of design requirements, and test and evaluation for the MRC Ground Support Equipment (GSE) and MRC BOC. The FY 2022 Base funding ensures safe and effective operational deployment of the MRC GSE and the prototype BOC. This funds the OEMs effort to obtain materials and sub-assemblies and to fabricate the MRC BOC and funds the system integration across military branches to include the OEM contractor and other government agencies in order to ensure a common MRC GSE. This effort completes the design, development, and integration of required characteristics to ensure safe and effective operational deployment. Provides for the Government and Contractor coordination required to participate and plan for initial Test and Evaluation events. Integration</p>	-	-	100.226

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604644A / <i>Mobile Medium Range Missile</i>	<b>Project (Number/Name)</b> MR1 / <i>Mobile Intermediate Range Missile</i>

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
<p>efforts include wireless communication, improved mobility, weight reduction, and M-Code implementation. Provides Government Program Management, Systems Engineering, SETA support, and technical control for MRC GSE project.</p> <p><b><i>FY 2021 to FY 2022 Increase/Decrease Statement:</i></b> Funding will provide all remaining material requirements as the BOC prototype fabrication continues, and as the test, integration, and checkout activities increase. In PB 21 R Form all costs in FY 2020 and FY 2021 were captured under MIRM. For PB 22 R Form additional program details were added.</p>			
<p><b><i>Title:</i></b> Mid-Range Capability (MRC) Missiles</p> <p><b><i>Description:</i></b> MRC funds Joint Service technologies and buys missiles, SM-6 and Tomahawk, needed for the operational deployment of the MRC prototype Battery. The missiles are capable of flying at various speeds and altitudes for mid-range distances to engage desired targets. The MRC project delivers a variety of missiles (both SM-6 and Tomahawk) in support of the MRC battery. The missiles are prescribed for use under basic load and test rounds only. MRC provides Government Program Management, Systems Engineering, SETA support, and technical control necessary for missile buys.</p> <p><b><i>FY 2022 Plans:</i></b> Buying missiles in FY22. Details at a higher classification.</p> <p><b><i>FY 2021 to FY 2022 Increase/Decrease Statement:</i></b> The FY 2022 funds the MRC Missiles buys. In PB 21 R Form all costs in FY 2020 and FY 2021 were captured under MIRM. For PB 22 R Form additional program details were added.</p>	-	-	139.741
<b>Accomplishments/Planned Programs Subtotals</b>	4.794	88.100	286.457

**C. Other Program Funding Summary (\$ in Millions)**

N/A

**Remarks**

**D. Acquisition Strategy**

The Mid-Range Capability (MRC) project will leverage existing contract vehicles to procure items currently in production through a combination of Army and Navy contracts. The MRC project will procure MRC specific analysis, design, development, and integration through a RCCTO prototype Other Transaction Authority (pOTA). The pOTA will leverage the Strategic Capabilities Office (SCO), Navy, and US Marine Corps (USMC) investments in weapon system development since 2016 by providing a body of data including Technical Data Packages (TDP), Critical Design Review (CDR) artifacts, and active production lines. These programs provide the MRC project with the opportunity to have common production, training, logistics, and sustainment with the SCO and Navy. To realize this opportunity, the RCCTO awarded a pOTA to Lockheed Martin (LM) in November 2020.

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army** **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604644A / Mobile Medium Range Missile	<b>Project (Number/Name)</b> MR1 / Mobile Intermediate Range Missile
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<b>Management Services (\$ in Millions)</b>				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Program Planning	Various	multiple : multiple	-	4.794	Nov 2020	3.959	Mar 2021	-		-		-	0.000	8.753	-
System Engineering and Program Management	Various	TBD : Huntsville, AL; National Capitol Region	-	-		-		12.027		-		12.027	11.786	23.813	-
<b>Subtotal</b>			-	4.794		3.959		12.027		-		12.027	11.786	32.566	N/A

<b>Product Development (\$ in Millions)</b>				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Contracts for technology development, integration, prototyping	Various	multiple : multiple	-	-		84.141	Mar 2021	-		-		-	0.000	84.141	-
Original Equipment Manufacturer (OEM)	SS/CPFF	Lockheed Martin : Various	-	-		-		84.200		-		84.200	19.233	103.433	-
Government Furnished Equipment (GFE)	Various	Various : Various	-	-		-		8.990		-		8.990	0.000	8.990	-
Other Government Agencies (OGA)	Various	Various : Various	-	-		-		24.080		-		24.080	0.000	24.080	-
MRC Missiles	Various	Navy Various : Various	-	-		-		139.140		-		139.140	0.000	139.140	-
<b>Subtotal</b>			-	-		84.141		256.410		-		256.410	19.233	359.784	N/A

<b>Support (\$ in Millions)</b>				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Cyber, Software, Transportation	Various	Various : Various	-	-		-		7.790		-		7.790	7.943	15.733	-
<b>Subtotal</b>			-	-		-		7.790		-		7.790	7.943	15.733	N/A



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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2022 Army</b>		<b>Date: May 2021</b>
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604644A / Mobile Medium Range Missile	<b>Project (Number/Name)</b> MR1 / Mobile Intermediate Range Missile

Event Name	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
MRC Launcher Payload Deployment System (PDS) Assembly									■																			
MRC Battery Operation Center (BOC) Assembly									■																			
Initial System Integration and Check Out													■															
New Materiel in Brief (NMIB)													■															
Initial Fielding													■															
Obtain Release to Train																	■											
NET													■															
TRR																	■											
Obtain Release to Deploy																	■											
SM-6 Missile Test																					■							
Tomahawk Missile Test																	■											
CLS																					■							
First Unit of Issue (FUI)																	■											

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604644A / <i>Mobile Medium Range Missile</i>	<b>Project (Number/Name)</b> MR1 / <i>Mobile Intermediate Range Missile</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
MRC Launcher Payload Deployment System (PDS) Assembly	1	2022	4	2022
MRC Battery Operation Center (BOC) Assembly	1	2022	4	2022
Initial System Integration and Check Out	3	2022	4	2022
New Materiel in Brief (NMIB)	3	2022	3	2022
Initial Fielding	1	2023	1	2024
Obtain Release to Train	1	2023	1	2024
NET	2	2023	3	2023
TRR	2	2023	2	2023
Obtain Release to Deploy	3	2023	3	2023
SM-6 Missile Test	3	2023	3	2023
Tomahawk Missile Test	3	2023	3	2023
CLS	4	2023	4	2024
First Unit of Issue (FUI)	4	2023	4	2023

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**Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Army** **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040: <i>Research, Development, Test &amp; Evaluation, Army / BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0604785A / <i>Integrated Base Defense (Budget Activity 4)</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	-	2.000	2.020	2.040	-	2.040	-	-	-	-	-	-
DS4: <i>Integrated Base Defense</i>	-	2.000	2.020	2.040	-	2.040	-	-	-	-	-	-

**A. Mission Description and Budget Item Justification**

The Fiscal Year (FY) 2022 Direct War/Enduring Operations dollars in the amount of \$2.040 million in Project DS4 will continue to support the Integrated Base Defense (IBD) integration and testing of software and hardware along with the development of analytical capabilities to support force protection systems and capabilities in the field as part of the Counter Vehicle Borne Improvised Explosive Device (CVBIED) program. IBD employs an enterprise approach to enable IBD capabilities across the operational spectrum by leveraging interoperability efforts in support of the Integrated Unit, Base, and Installation Protection framework focused on systems engineering, software development, and testing.

Counter Vehicle Borne Improvised Explosive Device (CVBIED) is an integrated suite of systems developed in response to CENTCOM JUONS CC-0540. The CVBIED program provides an early VBIED detection capability prior to vehicles reaching entry into Forward Operating Bases. Additional sensor systems are being integrated into the current Force Protection infrastructure as part of CVBIED.

<b>B. Program Change Summary (\$ in Millions)</b>	<b><u>FY 2020</u></b>	<b><u>FY 2021</u></b>	<b><u>FY 2022 Base</u></b>	<b><u>FY 2022 OCO</u></b>	<b><u>FY 2022 Total</u></b>
Previous President's Budget	2.000	2.020	0.000	-	0.000
Current President's Budget	2.000	2.020	2.040	-	2.040
Total Adjustments	0.000	0.000	2.040	-	2.040
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	-	-	2.040	-	2.040

**Change Summary Explanation**

Fiscal Year 2022 (FY22) increase for the continued development, integration and testing of CVBIED technologies into the current Force Protection infrastructure to address capabilities gaps within JUONS CC-0540.



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**Exhibit R-2A, RDT&E Project Justification:** PB 2022 Army **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4					<b>R-1 Program Element (Number/Name)</b> PE 0604785A / <i>Integrated Base Defense (Budget Activity 4)</i>				<b>Project (Number/Name)</b> DS4 / <i>Integrated Base Defense</i>			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022 Base</b>	<b>FY 2022 OCO</b>	<b>FY 2022 Total</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>FY 2026</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
DS4: <i>Integrated Base Defense</i>	-	2.000	2.020	2.040	-	2.040	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

Integrated Base Defense (IBD) RDT&E funding provides for the integration and testing of software and hardware along with the development of analytical capabilities to support force protection systems and capabilities in the field as part of the Counter Vehicle Borne Improvised Explosive Device (CVBIED) program. IBD employs an enterprise approach to enable IBD capabilities across the operational spectrum by leveraging interoperability efforts in support of the Integrated Unit, Base, and Installation Protection framework focused on systems engineering, software development and testing.

Counter Vehicle Borne Improvised Explosive Device (CVBIED) is an integrated suite of systems developed in response to CENTCOM JUONS CC-0540. The CVBIED program provides an early VBIED detection capability prior to vehicles reaching entry into Forward Operating Bases. Additional sensor systems are being integrated into the current Force Protection infrastructure as part of CVBIED.

OCO funding in the amount of \$2.040 million in FY22 supports continued integration of CVBIED technologies into the current Force Protection infrastructure to address capabilities gaps with JUONS CC-0540.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
<b>Title:</b> CVBIED Design and Build	2.000	2.020	2.040
<b>Description:</b> RDT&E efforts continue the development, integration and testing of CVBIED technologies into the current Force Protection infrastructure to address capabilities gaps within JUONS CC-0540.			
<b>FY 2021 Plans:</b> Funding will support continued integration of CVBIED technologies into the current Force Protection infrastructure to address capabilities gaps with JUONS CC-0540.			
<b>FY 2022 Plans:</b> No Base RDT&E provided.			
<b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> The increase was a fiscal inflation adjustment only factored against the FY21 requirement.			
<b>Accomplishments/Planned Programs Subtotals</b>	2.000	2.020	2.040

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604785A / <i>Integrated Base Defense (Budget Activity 4)</i>	<b>Project (Number/Name)</b> DS4 / <i>Integrated Base Defense</i>

**C. Other Program Funding Summary (\$ in Millions)**

<u>Line Item</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022</u> <u>Base</u>	<u>FY 2022</u> <u>OCO</u>	<u>FY 2022</u> <u>Total</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>FY 2026</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• M90115: <i>INTEG BASE</i> <i>DEF NONSTAND EQUIP</i> <i>(IBD NS-E) KITTING</i>	39.984	64.584	48.057	-	48.057	-	-	-	-	-	-

**Remarks**

**D. Acquisition Strategy**

The IBD acquisition strategy is to leverage the efforts of existing IBD-related government organizations and related technologies in order to award multiple contracts in support of IBD objectives for the development of holistic IBD architectures and products while also ensuring interoperability with fielded and emerging IBD-related systems. JUONS CC-0540 (CVBIED) equipment is comprised of a combination of Commercial and Government Off the Shelf items integrated to meet the requirements of JUONS CC-0540 (CVBIED).

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army** **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604785A / <i>Integrated Base Defense (Budget Activity 4)</i>	<b>Project (Number/Name)</b> DS4 / <i>Integrated Base Defense</i>
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<b>Product Development (\$ in Millions)</b>				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
JUONS CC-0540 System Integration	MIPR	CCDC AvMC : Huntsville, AL	-	0.732	Jan 2020	0.329	Jan 2021	0.329	Jan 2022	-		0.329	0.000	1.390	-
JUONS CC-0540 Hyper spectral Sensor Development Support	MIPR	CCDC C5ISR NVESD : Fort Belvoir, VA	-	-		0.471	Jan 2021	0.471	Feb 2022	-		0.471	0.000	0.942	-
JUONS CC-0540 Wide Area Motion Imagery Sensor Development	MIPR	NAVAIR : Patuxent River, MD	-	0.390	Jan 2020	0.450	Jan 2021	0.450	Mar 2022	-		0.450	0.000	1.290	-
Integrated System Architecture (ISA) SW Development Support	MIPR	CCDC C5ISR NVESD : Fort Belvoir	-	0.225		0.270	Jan 2021	0.270	Mar 2022	-		0.270	0.000	0.765	-
<b>Subtotal</b>			-	1.347		1.520		1.520		-		1.520	0.000	4.387	N/A

<b>Support (\$ in Millions)</b>				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Program Management Support	C/CPFF	PM TS : Fort Belvoir	-	0.055		-		-		-		-	0.000	0.055	-
<b>Subtotal</b>			-	0.055		-		-		-		-	0.000	0.055	N/A

<b>Test and Evaluation (\$ in Millions)</b>				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Test and Evaluation	MIPR	ATEC : Aberdeen Proving Ground, MD	-	0.598	Jan 2020	0.500	Oct 2020	0.520	Oct 2021	-		0.520	0.000	1.618	-
<b>Subtotal</b>			-	0.598		0.500		0.520		-		0.520	0.000	1.618	N/A

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<b>Exhibit R-3, RDT&amp;E Project Cost Analysis: PB 2022 Army</b>								<b>Date: May 2021</b>			
<b>Appropriation/Budget Activity</b> 2040 / 4				<b>R-1 Program Element (Number/Name)</b> PE 0604785A / <i>Integrated Base Defense (Budget Activity 4)</i>				<b>Project (Number/Name)</b> DS4 / <i>Integrated Base Defense</i>			
	<b>Prior Years</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022 Base</b>	<b>FY 2022 OCO</b>	<b>FY 2022 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>		
<b>Project Cost Totals</b>	-	2.000	2.020	2.040	-	2.040	0.000	6.060	N/A		

**Remarks**

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**Exhibit R-4, RDT&E Schedule Profile: PB 2022 Army** **Date: May 2021**

<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604785A / <i>Integrated Base Defense (Budget Activity 4)</i>	<b>Project (Number/Name)</b> DS4 / <i>Integrated Base Defense</i>
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Event Name	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Development, Test and Integration	System Development and Component Integration																											
Integration Test Events	AVIS Integration																											
Video Analytics/Computer Learning Integration	Computer Learning Integration																											
Fixed Control Station Integration	FCS Integration																											
Facial Recognition/ RFID implementation																												
Intelligent Remote Imaging Spectrometer- Ground and Kestrel Block I																												
Intelligent Remote Imaging Spectrometer- Ground and Kestrel Block II Phase II																												
Intelligent Remote Imaging Spectrometer - Ground and Kestrel Block II Phase III																												
GECO - NIDS Phase I																												
GECO - NIDS Phase II																												
ATEC Capabilities and Limitations- Increment 1																												
ATEC Capabilities and Limitations - Increment 2																												
ATEC Capabilities and Limitations - Increment 3																												

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<b>Exhibit R-4A, RDT&amp;E Schedule Details: PB 2022 Army</b>		<b>Date: May 2021</b>
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604785A / <i>Integrated Base Defense (Budget Activity 4)</i>	<b>Project (Number/Name)</b> DS4 / <i>Integrated Base Defense</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Development, Test and Integration	4	2019	4	2022
Integration Test Events	4	2019	4	2022
Video Analytics/Computer Learning Integration	4	2019	4	2021
Fixed Control Station Integration	1	2020	4	2022
Facial Recognition/ RFID implementation	4	2020	3	2021
Intelligent Remote Imaging Spectrometer- Ground and Kestrel Block II Phase I	1	2020	4	2020
Intelligent Remote Imaging Spectrometer- Ground and Kestrel Block II Phase II	1	2021	3	2021
Intelligent Remote Imaging Spectrometer - Ground and Kestrel Block II Phase III	4	2021	3	2022
GECO - NIDS Phase I	2	2021	4	2021
GECO - NIDS Phase II	1	2022	3	2022
ATEC Capabilities and Limitations- Increment 1	3	2020	4	2020
ATEC Capabilities and Limitations - Increment 2	2	2021	3	2021
ATEC Capabilities and Limitations - Increment 3	2	2022	3	2022

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2022 Army **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040: <i>Research, Development, Test &amp; Evaluation, Army / BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0305251A / <i>Cyberspace Operations Forces and Force Support</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	-	58.611	50.525	52.988	-	52.988	-	-	-	-	-	-
FA8: <i>Cyberspace Operations Forces and Force Support</i>	-	58.611	50.525	52.988	-	52.988	-	-	-	-	-	-

**A. Mission Description and Budget Item Justification**

Persistent Cyber Training Environment (PCTE) supports the United States Cyber Command (USCC) by enabling the critical need for the DoD Cyber Mission Force (CMF) to train at the individual, team, and force level. PCTE provides the DoD CMF with a standardized training capability that maximizes shared content across the Services to include emulated network environments and has the ability to connect to other range environments and cyber training assets. The PCTE platform is aligned to the outputs of the Office of the Under Secretary of Defense for Acquisition & Sustainment OUSD (A&S) and Chairman of the Joint Chiefs of Staff (CJCS) J6 led, "Cyber Range Evaluation of Alternatives (EOA) Findings and Issue Paper Deliberations," dated 17 November 2015. The Program Executive Office for Simulation, Training, and Instrumentation (PEO STRI) was designated as the DoD Acquisition Lead for the PCTE and the program is directed by the 2016 National Defense Authorization Act, Section 1645. With the Joint Requirements Oversight Council (JROC) validation of the Information System - Capability Development Document (IS-CDD) on 4 November 2019, the PCTE program quickly achieved Milestone B on 6 December 2019. Through ongoing rapid prototyping efforts, the PCTE platform has fulfilled the critical need for a CMF standardized training capability upon release of PCTE Version 2 in Fourth Quarter Fiscal Year 2020, and continues to do so with ongoing version releases.

FY 2022 PCTE funding will focus on United States Cyber Command (USCC) priorities within platform releases to include enhancing current capability fidelity while introducing additional features. Areas of planned feature updates and enhancements include CMF assessment capabilities, traffic generation augmentation, platform scalability and resourcing, content authoring and sharing tools, and pilots for infrastructure utility models. The PCTE platform will continue collaboration with all stakeholders within the Joint Cyber Warfighting Architecture (JCWA), and continue pilot activities to explore and define exploratory requirements efforts across the JCWA portfolio as prioritized through USCC. The PCTE platform will maintain accreditations at all classification levels to serve DoD CMF user training at the Unclassified, Secret, and Top Secret data classification levels. Platform infrastructure and licensing will be maintained to support the full DoD CMF user base.

FY2020 Enhanced Vehicle Security System, procured by the Army Rapid Capabilities and Critical Technologies Office (RCCTO), addressed major cyber readiness shortfalls as identified by the Secretary and the Army Chief of Staff to support the National Defense Strategy by mitigating cyber vulnerabilities on combat weapon system platforms and capability gaps identified within the cyberspace operations forces. Enhanced Vehicle Security System is separate and distinct from the PCTE program.

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2022 Army	<b>Date:</b> May 2021
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<b>Appropriation/Budget Activity</b> 2040: <i>Research, Development, Test &amp; Evaluation, Army / BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0305251A / <i>Cyberspace Operations Forces and Force Support</i>
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<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022 Base</b>	<b>FY 2022 OCO</b>	<b>FY 2022 Total</b>
Previous President's Budget	52.102	50.525	48.644	-	48.644
Current President's Budget	58.611	50.525	52.988	-	52.988
Total Adjustments	6.509	0.000	4.344	-	4.344
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	6.509	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	-	-	4.344	-	4.344

**Change Summary Explanation**

FY 2022 funding increase due to Technical Guidance Memo (TGM) to provide the required support for Cyber Mission Forces.



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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army										<b>Date:</b> May 2021		
<b>Appropriation/Budget Activity</b> 2040 / 4					<b>R-1 Program Element (Number/Name)</b> PE 0305251A / <i>Cyberspace Operations Forces and Force Support</i>				<b>Project (Number/Name)</b> FA8 / <i>Cyberspace Operations Forces and Force Support</i>			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022 Base</b>	<b>FY 2022 OCO</b>	<b>FY 2022 Total</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>FY 2026</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
FA8: <i>Cyberspace Operations Forces and Force Support</i>	-	58.611	50.525	52.988	-	52.988	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

Persistent Cyber Training Environment (PCTE) supports the United States Cyber Command (USCC) by enabling the critical need for the DoD Cyber Mission Force (CMF) to train at the individual, team, and force level. PCTE provides the DoD CMF with a standardized training capability that maximizes shared content across the Services to include emulated network environments and has the ability to connect to other range environments and cyber training assets. The PCTE platform is aligned to the outputs of the Office of the Under Secretary of Defense for Acquisition & Sustainment OUSD (A&S) and Chairman of the Joint Chiefs of Staff (CJCS) J6 led, "Cyber Range Evaluation of Alternatives (EOA) Findings and Issue Paper Deliberations," dated 17 November 2015. The Program Executive Office for Simulation, Training, and Instrumentation (PEO STRI) was designated as the DoD Acquisition Lead for the PCTE and the program is directed by the 2016 National Defense Authorization Act, Section 1645. With the Joint Requirements Oversight Council (JROC) validation of the Information System - Capability Development Document (IS-CDD) on 4 November 2019, the PCTE program quickly achieved Milestone B on 6 December 2019. Through ongoing rapid prototyping efforts, the PCTE platform has fulfilled the critical need for a CMF standardized training capability upon release of PCTE Version 2 in Fourth Quarter Fiscal Year 2020, and continues to do so with ongoing version releases.

FY 2022 PCTE funding will focus on United States Cyber Command (USCC) priorities within platform releases to include enhancing current capability fidelity while introducing additional features. Areas of planned feature updates and enhancements include CMF assessment capabilities, traffic generation augmentation, platform scalability and resourcing, content authoring and sharing tools, and pilots for infrastructure utility models. The PCTE platform will continue collaboration with all stakeholders within the Joint Cyber Warfighting Architecture (JCWA), and continue pilot activities to explore and define exploratory requirements efforts across the JCWA portfolio as prioritized through USCC. The PCTE platform will maintain accreditations at all classification levels to serve DoD CMF user training at the Unclassified, Secret, and Top Secret data classification levels. Platform infrastructure and licensing will be maintained to support the full DoD CMF user base.

FY2020 Enhanced Vehicle Security System, procured by the Army Rapid Capabilities and Critical Technologies Office (RCCTO), addressed major cyber readiness shortfalls as identified by the Secretary and the Army Chief of Staff to support the National Defense Strategy by mitigating cyber vulnerabilities on combat weapon system platforms and capability gaps identified within the cyberspace operations forces. Enhanced Vehicle Security System is separate and distinct from the PCTE program.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
<b>Title:</b> Event Management for Persistent Cyber Training Environment (PCTE)	25.600	37.897	41.124
<b>Description:</b> Develop event scheduling, allocation, and management function for PCTE, to include event design, planning and execution, supported by standardized training assessment tools and capabilities.			

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army		<b>Date:</b> May 2021		
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0305251A / <i>Cyberspace Operations Forces and Force Support</i>	<b>Project (Number/Name)</b> FA8 / <i>Cyberspace Operations Forces and Force Support</i>		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
<p><b><i>FY 2021 Plans:</i></b> PCTE capabilities will be scaled to support the full DoD Cyber Mission Force (CMF) user base. New capabilities, as prioritized by the United States Cyber Command (USCC) and CMF feedback, will include enhanced CMF assessment capabilities, traffic generation augmentation, platform scalability and resourcing, content authoring and sharing tools, and pilots for infrastructure utility models.</p> <p><b><i>FY 2022 Plans:</i></b> PCTE capabilities will continue to support the full DoD Cyber Mission Force (CMF) user base. New capabilities and features, as prioritized by the United States Cyber Command (USCC) and CMF feedback, will include enhanced CMF assessment capabilities, traffic generation augmentation, platform scalability and resourcing, content authoring and sharing tools, and pilots for infrastructure utility models.</p> <p><b><i>FY 2021 to FY 2022 Increase/Decrease Statement:</i></b> Funding was increased to expand new capabilities and features which includes enhanced CMF assessment capabilities, traffic generation augmentation, platform scalability and resourcing, content authoring and sharing tools, and pilots for infrastructure utility models. These new PCTE features will be developed, integrated and tested.</p>				
<p><b><i>Title:</i></b> Environment Operations and Management for Persistent Cyber Training Environment (PCTE)</p> <p><b><i>Description:</i></b> Develop PCTE with realistic vignettes/scenarios as part of a system (syllabus) of individual and collective training that includes certification and real-world mission rehearsals.</p> <p><b><i>FY 2021 Plans:</i></b> PCTE virtual environments will be maintained, with limited expansion due to the increase in platform capabilities to support the full DoD Cyber Mission Force (CMF) user base. PCTE will continue to integrate virtual environments training resources which will include minor enhancements prioritized by user feedback.</p> <p><b><i>FY 2022 Plans:</i></b> Will continue to maintain PCTE virtual environments with an emphasis on collaboration with all stakeholders within the Joint Cyber Warfighting Architecture (JCWA), and conduct initial pilot and exploratory requirements definition efforts across the JCWA portfolio as prioritized through United States Cyber Command (USCC).</p> <p><b><i>FY 2021 to FY 2022 Increase/Decrease Statement:</i></b> Funding was increased to expand the PCTE functionality, and integrate Joint Cyber Warfighting Architecture (JCWA) portfolio functionality as prioritized and coordinated through United States Cyber Command (USCC).</p>		13.400	4.244	4.657
<p><b><i>Title:</i></b> Physical and Virtual Connectivity for the Persistent Cyber Training Environment (PCTE)</p>		10.600	6.592	5.500

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0305251A / <i>Cyberspace Operations Forces and Force Support</i>	<b>Project (Number/Name)</b> FA8 / <i>Cyberspace Operations Forces and Force Support</i>

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
<p><b>Description:</b> PCTE has procured, installed and is maintaining Regional Compute and Storage (RCS) nodes which enable on-demand, reliable, and secure virtual access from wherever participants are geographically located. Additionally, the PCTE RCS infrastructure create a core cyber exercise network and event management platform to support Cyber Mission Force (CMF) training at the Unclassified, Secret, and Top Secret data classification levels.</p> <p><b>FY 2021 Plans:</b> Will maintain the current build out of the PCTE Regional Compute and Storage (RCS) nodes while leveraging DoD enterprise transport services spanning multiple classification levels (Top Secret to Unclassified) to perform training.</p> <p><b>FY 2022 Plans:</b> The PCTE Regional Compute and Storage (RCS) nodes will continue infrastructure enhancements through a migration to a consumption based model while continuing to leverage DoD enterprise transport services with access on all classification levels (Top Secret to Unclassified) to perform training.</p> <p><b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> Funding was reduced due to completion and deployment of Regional Compute and Storage (RCS). In addition, the consumption based model of procuring licenses and services required to support and perform training will serve as key RCS infrastructure initiatives to better support the full DoD Cyber Mission Force user base.</p>			
<p><b>Title:</b> Persistent Cyber Training Environment (PCTE) Test and Evaluation</p> <p><b>Description:</b> Persistent Cyber Training Environment (PCTE) integration, development, and operational testing that will include validation and verifications (V&amp;V), operational assessments (OA), and testing in association with cyber training exercises and incorporated throughout the Product Manager (PM) Development Operations (DevOps) process. An Operational Test Authority (OTA) has been incorporated, in coordination with the Director, Operational Test and Evaluation (DOT&amp;E), to conduct operational testing leveraging DevOps testing processes.</p> <p><b>FY 2021 Plans:</b> Testing will continue in FY 2021 with integration, verification and validation testing of the PCTE capability. The focus for FY 2021 is on verifying existing and new capability through developmental testing and operational assessments. PCTE will be transitioning to a more formal Development Security Operations (DevSecOps) process. Operational Assessments will shift from a single OA post PCTE production releases to continuous OA complementing the Agile DevSecOps process.</p> <p><b>FY 2022 Plans:</b> Testing will continue in FY 2022 with integration, verification and validation testing of the PCTE capability. The focus for FY 2022 is on verifying existing and new capability through continuous testing and cyber resiliency assessments. Test efforts in FY22</p>	2.502	1.792	1.707

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0305251A / <i>Cyberspace Operations Forces and Force Support</i>	<b>Project (Number/Name)</b> FA8 / <i>Cyberspace Operations Forces and Force Support</i>

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
include the initial integration and testing with other platforms within the Joint Capability Warfighter Architecture (JCWA). PCTE will integrate Persistent Cyber Operations, conducting continuous, blue team, red team, and purple team cyber assessments  <b><i>FY 2021 to FY 2022 Increase/Decrease Statement:</i></b> Funds decreased due to testing efficiencies realized through the use of agile testing best practices and automated testing which will reduce test and evaluation timelines.			
<b><i>Title:</i></b> Enhanced Vehicle Security System  <b><i>Description:</i></b> Funds will be used to complete system design, development, integration, testing and delivery of the Enhanced Vehicle Security System. This effort addresses major cyber readiness shortfalls as identified by the Secretary and Army Chief of Staff. The capability supports the National Defense Strategy by mitigating cyber vulnerabilities on combat weapon system platforms and directly addresses capability gaps as identified within the cyberspace operations forces.	6.509	-	-
<b>Accomplishments/Planned Programs Subtotals</b>	58.611	50.525	52.988

<b>C. Other Program Funding Summary (\$ in Millions)</b>											
<b>Line Item</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022 Base</b>	<b>FY 2022 OCO</b>	<b>FY 2022 Total</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>FY 2026</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
• B65010: <i>Persistent Cyber Training Environment</i>	3.000	-	-	-	-	-	-	-	-	-	-

**Remarks**  
B65010-Other Procurement Army 2 (OPA2) - In FY 2021, OPA funds reprogrammed to Operations and Maintenance Army (OMA) (APE 151251000, MDEP VLWA) for software licensing for cyber training applications. PCTE has procured and installed the appropriate hardware infrastructure footprint to enable the platform to serve the Cyber Mission Force user base.

**D. Acquisition Strategy**  
The Persistent Cyber Training Environment (PCTE) program will employ an incremental acquisition strategy. The current strategy leverages the use of existing cyber contracts and Other Transaction Authority (OTA) vehicles to provide specified capabilities that will be integrated into a cohesive training platform. The next step in the acquisition strategy is developing a long term contract vehicle that will continue enabling the PCTE platform to achieve scalability, optimization, innovation, and quality standards to meet the dynamic needs of the Cyber Mission Force (CMF) user base. The Product Manager is in the process of awarding an integration focused Single Award Indefinite Delivery/Indefinite Quantity (ID/IQ) contract to serve PCTE as well as other cyber community customers called the Cyber Training, Readiness, Integration, Delivery, and Enterprise Technology (TRIDENT) contract in Q4 FY2021. CYBER TRIDENT enables PCTE to provide iterative capability provided to the Cyber Mission Forces (CMF) in Capability Drops (CDs) that either improve or add features. These CDs will be based on requirements contained and further developed as part of the PCTE Information System - Capability Development Document (IS-CDD).

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army												Date: May 2021			
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)							
2040 / 4				PE 0305251A / Cyberspace Operations Forces and Force Support				FA8 / Cyberspace Operations Forces and Force Support							
Management Services (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Government Program Management	TBD	Various : Various	2.300	-		-		-		-		-	Continuing	Continuing	Continuing
<b>Subtotal</b>			2.300	-		-		-		-		-	Continuing	Continuing	N/A
Product Development (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
PCTE Development and Integration	C/IDIQ	Various : Various	128.812	49.602	Feb 2020	1.636	Feb 2021	1.700	Feb 2022	-		1.700	Continuing	Continuing	Continuing
PCTE Cyber Training, Readiness, Integration, Delivery, and Enterprise Technology (TRIDENT)	C/IDIQ	Various : Various	-	-		16.000	Feb 2021	24.581	Mar 2022	-		24.581	Continuing	Continuing	Continuing
PCTE Development and Integration - Other Transactional Authority	Option/FFP	Various : Various	-	-		31.097	Oct 2020	25.000	Nov 2021	-		25.000	Continuing	Continuing	Continuing
Enhanced Vehicle Security System	C/TBD	Aberdeen Proving Ground : Aberdeen, Maryland	-	6.509	Nov 2020	-		-		-		-	0.000	6.509	-
<b>Subtotal</b>			128.812	56.111		48.733		51.281		-		51.281	Continuing	Continuing	N/A
Test and Evaluation (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
PCTE Government Test and Evaluation	Various	Various : Various	7.112	2.500	Mar 2020	1.792	Mar 2021	1.707	Mar 2022	-		1.707	Continuing	Continuing	Continuing
<b>Subtotal</b>			7.112	2.500		1.792		1.707		-		1.707	Continuing	Continuing	N/A
<b>Remarks</b>															
Validation and Verification tests at CMF existing training events will be conducted with every capability drop utilizing Cyber Mission Force operators and representatives from															





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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2022 Army</b>		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0305251A / <i>Cyberspace Operations Forces and Force Support</i>	<b>Project (Number/Name)</b> FA8 / <i>Cyberspace Operations Forces and Force Support</i>

Event Name	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Platform Releases (v1.0 – v9.0) - (IS-CDD 1)																												
PCTE v1.0	1 PCTE v1.0																											
PCTE v2.0		2 PCTE v2.0																										
PCTE v3.0			3 PCTE v3.0																									
PCTE v4.0				4 PCTE v4.0																								
PCTE v5.0					5 PCTE v5.0																							
PCTE v6.0						6 PCTE v6.0																						
PCTE v7.0							7 PCTE v7.0																					
PCTE v8.0								8 PCTE v8.0																				
PCTE v9.0									9 PCTE v9.0																			
Platform Releases (v10.0 - vX.0) - (IS-CDD 2)																												
PCTE v10.0																				10 PCTE v10.0								
PCTE v11.0																								11 PCTE v11.0				

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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2022 Army</b>			<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0305251A / <i>Cyberspace Operations Forces and Force Support</i>	<b>Project (Number/Name)</b> FA8 / <i>Cyberspace Operations Forces and Force Support</i>	

Event Name	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
PCTE v12.0																									 PCTE v12.0			
PCTE v13.0																									 PCTE v13.0			



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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0305251A / <i>Cyberspace Operations Forces and Force Support</i>	<b>Project (Number/Name)</b> FA8 / <i>Cyberspace Operations Forces and Force Support</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Prototype Releases (A-C) ? (Risk Reduction Efforts)	4	2018	4	2019
PCTE vA	4	2018	4	2018
PCTE vB	2	2019	2	2019
PCTE vC	4	2019	4	2019
Platform Releases (v1.0 ? v9.0) - (IS-CDD 1)	2	2020	4	2025
PCTE v1.0	2	2020	2	2020
PCTE v2.0	4	2020	4	2020
PCTE v3.0	2	2021	2	2021
PCTE v4.0	4	2021	4	2021
PCTE v5.0	2	2022	2	2022
PCTE v6.0	4	2022	4	2022
PCTE v7.0	2	2023	2	2023
PCTE v8.0	4	2023	4	2023
PCTE v9.0	2	2024	2	2024
Platform Releases (v10.0 - vX.0) - (IS-CDD 2)	4	2024	2	2026
PCTE v10.0	4	2024	4	2024
PCTE v11.0	2	2025	2	2025
PCTE v12.0	4	2025	4	2025
PCTE v13.0	2	2026	2	2026

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2022 Army **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040: <i>Research, Development, Test &amp; Evaluation, Army / BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 1206120A / <i>Assured Positioning, Navigation and Timing (PNT)</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	-	133.307	-	-	-	-	-	-	-	-	-	-
FJ8: <i>Assured Positioning, Navigation and Timing (PNT)</i>	-	40.635	-	-	-	-	-	-	-	-	-	-
FJ9: <i>Dismounted A-PNT</i>	-	29.492	-	-	-	-	-	-	-	-	-	-
FK2: <i>Mounted A-PNT</i>	-	54.725	-	-	-	-	-	-	-	-	-	-
FK3: <i>Anti-Jam Antenna</i>	-	8.455	-	-	-	-	-	-	-	-	-	-

**A. Mission Description and Budget Item Justification**

Assured Positioning, Navigation and Timing (A-PNT) provides Army ground maneuver forces access to assured PNT information under conditions where space-based PNT Global Positioning System (GPS) may be limited or denied (jammed and spoofed). A-PNT products are ruggedized tactical systems that enable Army forces at echelon the ability to shoot, move, communicate, and protect their forces to penetrate and dis-integrate enemy anti-access systems, thereby allowing them to maneuver from operational and strategic distances to close with, destroy, and exploit the enemy in close and deep maneuver areas with sufficient combat bower, tempo, and momentum. A-PNT addresses two critical capability gaps: Access and Integrity. Access is the ability to retrieve accurate PNT information in a contested Electronic Warfare/Cyber environment. Integrity is the ability to trust the PNT information. PNT is a critical enabler of many Army Maneuver, Fires, and Command and Control systems that are dependent on accurate Position and Timing, and a foundational Multi-Domain Battle capability to support: calibrated force posture (position and maneuver across strategic distances); multi-domain formations (operate in contested spaces against near-peer adversaries); convergence (continuous integration of capabilities in all domains). The current Global Positioning System (GPS) capability is a fixed frequency system susceptible to electronic warfare and field environments (e.g. urban, dense vegetation).

Joint Requirements Oversight Council Memo (JROCM) 049-10, dated 05 April 2010, approved the PNT Assurance Initial Capabilities Document and designated the Army as the Lead Component for Assured PNT. Army Futures Command approved the Mounted A-PNT System (MAPS) Directed Requirement (DR) on 13 January 2019. The Dismounted A-PNT System (DAPS) Directed Requirement was approved 05 April 2019. The Alternative Navigation (ALTNAV) Directed Requirement was approved in November 2019. MAPS transitions to a Capability Development Document (CDD) in June 2020 and DAPS transitions in FY 2021.

Assured Positioning, Navigation and Timing (A-PNT) consists of:

(FJ8) - The Assured PNT project funding line is for: PNT System of Systems Architecture (SOSA) Testing to validate performance of end-to-end system performance; Resiliency and Software Assurance Measures (RSAM) upgrades to legacy GPS systems. In addition, this line supports the development of complementary and adjacent A-PNT technologies as well as Enterprise Enablers including the Alternative Navigation (ALT NAV) signal Enterprise Build-out. These technologies will be integrated into future products, strategies, concepts of operation, architectures, and platforms to assure PNT.

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2022 Army	<b>Date:</b> May 2021
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<b>Appropriation/Budget Activity</b> 2040: <i>Research, Development, Test &amp; Evaluation, Army / BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 1206120A / <i>Assured Positioning, Navigation and Timing (PNT)</i>
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(FJ9) - Dismounted Assured PNT (A-PNT) System (DAPS) will provide the Soldiers equipped with Nett Warrior and other Soldier architecture compliant systems (e.g. Integrated Visual Augmentation System (IVAS)) conducting operations outside of vehicles, unhindered access the critical timing and position data to effectively engage targets, share data across the network and conduct mission command functions.

(FK1) - The Pseudolite project was terminated by the Army on 12 February 2019.

(FK2) - The Mounted Assured Positioning, Navigation, and Timing (PNT) System (MAPS) is a platform-mounted, ruggedized tactical PNT system which provides electronic protection capabilities that enable combatant commanders the ability to move, shoot, and communicate in a Global Positioning System (GPS) challenged or denied environments.

(FK3) - The Anti-Jam Antenna Systems (AJAS) provides GPS signal point protection and PNT Assurance in challenged environments through Anti-Jam technologies. AJAS enables tactical capabilities through assured signal acquisition in challenged environments. The AJAS will assist in delivering distributed assured PNT capabilities to mounted platforms over time in an iterative, affordable manner that allows for future modernization.

<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022 Base</b>	<b>FY 2022 OCO</b>	<b>FY 2022 Total</b>
Previous President's Budget	139.110	0.000	0.000	-	0.000
Current President's Budget	133.307	0.000	0.000	-	0.000
Total Adjustments	-5.803	0.000	0.000	-	0.000
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-0.079	-			
• SBIR/STTR Transfer	-5.724	-			

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army										<b>Date:</b> May 2021		
<b>Appropriation/Budget Activity</b> 2040 / 4					<b>R-1 Program Element (Number/Name)</b> PE 1206120A / Assured Positioning, Navigation and Timing (PNT)				<b>Project (Number/Name)</b> FJ8 / Assured Positioning, Navigation and Timing (PNT)			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022 Base</b>	<b>FY 2022 OCO</b>	<b>FY 2022 Total</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>FY 2026</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
FJ8: Assured Positioning, Navigation and Timing (PNT)	-	40.635	-	-	-	-	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**Note**

Program Element (PE) 1206120A project FJ8, planned program title Assured Positioning, Navigation and Timing Enterprise Enablers transitions to PE 0604120A project BV4 beginning in FY21.

Program Element (PE) 1206120A project FJ8, planned program title PNT System of System (SOSA) Testing and Resiliency and Software Assurance Measures (RSAM) transitions to PE 0604120A project ED5 beginning in FY21.

**A. Mission Description and Budget Item Justification**

The Assured Positioning, Navigation and Timing (PNT) project funds the Resiliency and Software Assurance Measures (RSAM) which provides increased capability and situational awareness for 500,000+ fielded legacy military Global Positioning System (GPS) receivers supporting systems and soldiers through at least 2035. Legacy GPS receivers targeted for RSAM enhancements, include but are not limited to, 226,000 Defense Advanced GPS Receiver (DAGR) and 200,000+ embedded Ground Based-GPS Receiver Applications Module (GB-GRAM). RSAM mitigates risks in a GPS-challenged operational environment until future Positioning, Navigation and Timing (PNT) solutions are fully deployed. This line also funds the Assured PNT enablers which includes prototype development and testing to demonstrate and prove emerging capabilities for legacy and future PNT resilient solutions. Assured PNT enablers also includes the Alternative Navigation signal enterprise build-out, providing PNT data in a denied or degraded environment.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
<b>Title:</b> PNT System of System (SOSA) Testing and Resiliency and Software Assurance Measures (RSAM)	13.583	-	-
<b>Description:</b> The effort supports SOSA testing, RSAM and other Army PNT capabilities.			
<b>Title:</b> Assured Positioning, Navigation and Timing (PNT) Enterprise Enablers and Build-out	27.052	-	-
<b>Description:</b> Enterprise Enablers provide enhanced PNT capability across an operational enterprise. These materiel solutions may augment or replace GPS by providing complementary PNT information. As complementary PNT providers, Enterprise Enablers build resiliency and robustness by diversifying PNT sources to ensure Soldiers have the right PNT information to drive mission success.			
<b>Accomplishments/Planned Programs Subtotals</b>	40.635	-	-

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army	<b>Date:</b> May 2021
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<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 1206120A / <i>Assured Positioning, Navigation and Timing (PNT)</i>	<b>Project (Number/Name)</b> FJ8 / <i>Assured Positioning, Navigation and Timing (PNT)</i>
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**C. Other Program Funding Summary (\$ in Millions)**

<u>Line Item</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022</u> <u>Base</u>	<u>FY 2022</u> <u>OCO</u>	<u>FY 2022</u> <u>Total</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>FY 2026</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• K49010: <i>Mounted/Dismounted Receivers</i>	1.724	5.894	1.990	-	1.990	-	-	-	-	-	-

**Remarks**  
K49010: Mounted/Dismounted Receivers is an OPA subset of Line Item Number 9897K49000 / Assured Positioning, Navigation and Timing.

**D. Acquisition Strategy**

The planned acquisition strategy for Positioning, Navigation and Timing (PNT) System of Systems Architecture (SOSA) testing and Resiliency and Software Assurance Measures (RSAM) implementation is to award sole source contracts to the original equipment manufacturers and leverage the Communications Electronics Research Development Engineering Center (CERDEC) to develop and evaluate solutions to enhance the resiliency of Global Positioning System (GPS)-dependent systems operating in evolving contested environments. PNT SOSA testing and RSAM implementation will complete software development for Defense Advanced GPS Receiver (DAGR), Ground Based GPS Receiver Applications Module (GB-GRAM), and MicroGRAM to include engineering build testing and formal qualification testing, as well as integration and integration testing, for platforms utilizing DAGR, GB-GRAM and MicroGRAM engineering builds.

The Assured PNT Enterprise Enablers project will conduct market research, prototyping, experimentation, and technical demonstrations of Alternative Navigation (ALT NAV), emerging situational awareness capabilities and net-enabled GPS solutions. These solutions will leverage commercial capabilities, existing contracts, industry, academia, and the warfighter in an iterative process, that will be integrated into future products, strategies, concepts of operation, architectures, and platforms to assure PNT.

The Assured PNT Enterprise Build-out will conduct network integration, installation and testing of the assured timing/location modular enterprise capability for ALT NAV. ALT NAV provides positioning, navigation and timing data in a denied or degraded environment. Enterprise Buildout will be completed to enable ALT NAV capabilities.

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army** **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 1206120A / Assured Positioning, Navigation and Timing (PNT)	<b>Project (Number/Name)</b> FJ8 / Assured Positioning, Navigation and Timing (PNT)
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<b>Management Services (\$ in Millions)</b>				<b>FY 2020</b>		<b>FY 2021</b>		<b>FY 2022 Base</b>		<b>FY 2022 OCO</b>		<b>FY 2022 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>			
RSAM Project Management Support	Allot	PM PNT : Various	3.056	0.593	Jan 2020	-		-		-		-	0.000	3.649	-
FY 2018 NDAA SEC 825 MDAP Cost Overrun	TBD	TBD : TBD	0.118	-		-		-		-		-	0.000	0.118	-
<b>Subtotal</b>			3.174	0.593		-		-		-		-	0.000	3.767	N/A

<b>Product Development (\$ in Millions)</b>				<b>FY 2020</b>		<b>FY 2021</b>		<b>FY 2022 Base</b>		<b>FY 2022 OCO</b>		<b>FY 2022 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>			
RSAM - DAGR Software Development	SS/CPFF	Rockwell Collins : Cedar Rapids, IA	2.102	3.368	Dec 2019	-		-		-		-	0.000	5.470	-
RSAM - GB-GRAM Software Development	SS/CPFF	Rockwell Collins : Cedar Rapids, IA	0.272	2.902	Feb 2020	-		-		-		-	0.000	3.174	-
Assured PNT Enterprise Enablers	C/FFP	Various : Various	-	18.160	Dec 2019	-		-		-		-	0.000	18.160	-
Assured PNT Enterprise Buildout	MIPR	Various : Various	27.955	8.892	Dec 2019	-		-		-		-	0.000	36.847	-
RSAM Army Modernization Priorities	MIPR	Rockwell Collins : Cedar Rapids, IA	2.034	1.339		-		-		-		-	0.000	3.373	-
FY 2019 Pending Rescission	TBD	TBD : TBD	2.913	-		-		-		-		-	0.000	2.913	-
<b>Subtotal</b>			35.276	34.661		-		-		-		-	0.000	69.937	N/A

<b>Support (\$ in Millions)</b>				<b>FY 2020</b>		<b>FY 2021</b>		<b>FY 2022 Base</b>		<b>FY 2022 OCO</b>		<b>FY 2022 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>			
RSAM Engineering and Technical Contracting Services	C/FFP	DCS Corp : APG, MD	9.110	1.928	Jan 2020	-		-		-		-	0.000	11.038	-

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army** **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 1206120A / Assured Positioning, Navigation and Timing (PNT)	<b>Project (Number/Name)</b> FJ8 / Assured Positioning, Navigation and Timing (PNT)
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<b>Support (\$ in Millions)</b>				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
RSAM Engineering and Technical Government Services	MIPR	C4ISR : Various	6.833	1.102	Jan 2020	-		-		-		-	0.000	7.935	-
Assured PNT Enterprise Enablers Contractor Engineering Support	Various	DCS Corporation : APG, MD	0.328	-		-		-		-		-	0.000	0.328	-
<b>Subtotal</b>			16.271	3.030		-		-		-		-	0.000	19.301	N/A

<b>Test and Evaluation (\$ in Millions)</b>				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
SOSA Testing/RSAM - Government Eng Support	MIPR	Various : Various	0.826	0.620	Jan 2020	-		-		-		-	0.000	1.446	-
SOSA Testing/RSAM - Contractor Eng Support	C/CPFF	Various : Various	1.276	0.308	Jan 2020	-		-		-		-	0.000	1.584	-
RSAM Platform Integration Testing	C/Various	Various : Various	3.700	0.535	Mar 2020	-		-		-		-	0.000	4.235	-
SOSA Testing/RSAM Test Equipment	C/Various	Various : Various	0.191	0.888	Jun 2020	-		-		-		-	0.000	1.079	-
Assured PNT Enterprise Buildout Test Support	C/Various	Various : Various	1.914	-		-		-		-		-	0.000	1.914	-
<b>Subtotal</b>			7.907	2.351		-		-		-		-	0.000	10.258	N/A

	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
<b>Project Cost Totals</b>		62.628	40.635	0.000	-	-	0.000	103.263	N/A

**Remarks**

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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2022 Army</b>		<b>Date: May 2021</b>
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 1206120A / Assured Positioning, Navigation and Timing (PNT)	<b>Project (Number/Name)</b> FJ8 / Assured Positioning, Navigation and Timing (PNT)

Event Name	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
PNT System of Systems Architecture (SOSA) Testing	SOSA Testing																											
RSAM - DAGR Software Development and Testing	DAGR Software Development and Testing																											
RSAM DAGR Update 1 Software Release	1 DAGR Update 1																											
RSAM - GB-GRAM/MicroGRAM Software Development and Testing	GB-GRAM/MicroGRAM Software Development and Testing																											
RSAM GB-GRAM Update 1 Software Release	2 GB-GRAM Update 1																											
RSAM MicroGRAM Update 1 Software Release					3 MicroGRAM Update 1																							
Platform Integration Testing	Platform Integration Testing																											
Army Enterprise Enablers	Army Enterprise Enablers																											

**Note**  
Program Element (PE) 1206120A project FJ8, planned program title Assured Positioning, Navigation and Timing Enterprise Enablers transitions to PE 0604120A project BV4 beginning in FY21.



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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2022 Army</b>		<b>Date: May 2021</b>
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 1206120A / <i>Assured Positioning, Navigation and Timing (PNT)</i>	<b>Project (Number/Name)</b> FJ8 / <i>Assured Positioning, Navigation and Timing (PNT)</i>

Program Element (PE) 1206120A project FJ8, planned program title PNT System of System (SOSA) Testing and Resiliency and Software Assurance Measures (RSAM) transitions to PE 0604120A project ED5 beginning in FY21.

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<b>Exhibit R-4A, RDT&amp;E Schedule Details: PB 2022 Army</b>		<b>Date: May 2021</b>
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 1206120A / <i>Assured Positioning, Navigation and Timing (PNT)</i>	<b>Project (Number/Name)</b> FJ8 / <i>Assured Positioning, Navigation and Timing (PNT)</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
PNT System of Sytems Architecture (SOSA) Testing	1	2019	4	2020
RSAM - DAGR Software Development and Testing	1	2019	4	2020
RSAM DAGR Update 1 Software Release	3	2020	3	2020
RSAM - GB-GRAM/MicroGRAM Software Development and Testing	1	2019	4	2020
RSAM GB-GRAM Update 1 Software Release	3	2020	3	2020
RSAM MicroGRAM Update 1 Software Release	1	2021	1	2021
Platform Integration Testing	1	2019	4	2020
Army Enterprise Enablers	1	2019	4	2021

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**Exhibit R-2A, RDT&E Project Justification:** PB 2022 Army **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 1206120A / Assured Positioning, Navigation and Timing (PNT)	<b>Project (Number/Name)</b> FJ9 / Dismounted A-PNT
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
FJ9: Dismounted A-PNT	-	29.492	-	-	-	-	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

**Note**

Program Element (PE) 1206120A project FJ9 transitions to PE 0604120A project EH8 beginning in FY 2021.

**A. Mission Description and Budget Item Justification**

Dismounted Assured PNT (A-PNT) System (DAPS) implements congressional and OSD guidance to develop and field Military Code (M-Code) Ground User Equipment (MGUE) receivers and provides the Soldiers equipped with Nett Warrior (NW) and other Soldier architecture compliant systems (e.g. Integrated Visual Augmentation System (IVAS)) the critical timing and position data to effectively engage targets, share data across the network, and conduct mission command functions. DAPS is planned to be a size, weight and power (SWaP) optimized form-factor that paces the threats and includes development and integration of Global Positioning System (GPS) and non-GPS sensors. DAPS integrates with the NW system and other Soldier architecture compliant systems, and distributes PNT information to the End-User Device (EUD). DAPS includes receiver software capable of fusing sensors and Global Navigation Satellite Systems (GNSS) signals resulting in additional integrity for military GPS in denied environments and includes a M-Code receiver solution, or a Selective Availability Anti-Spoofing Module (SAASM) system with growth path to M-Code.

Through an iterative approach, DAPS will continue to fuse M-Code, GNSS, and non-GPS sensors, as well as fuse Alternate Navigation (ALTNAV) and other complementary PNT sources in a SWaP constrained system in order to pace/overmatch the threat and continue to deliver critical timing and position data to effectively engage targets, share data across the network, and conduct mission command functions.

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	FY 2020	FY 2021	FY 2022
<b>Title:</b> Dismounted A-PNT System (DAPS)	29.492	-	-
<b>Description:</b> This effort supports the development and delivery of DAPS prototypes for integration, evaluation and performance testing.			
<b>Accomplishments/Planned Programs Subtotals</b>	29.492	-	-

**C. Other Program Funding Summary (\$ in Millions)**

Line Item	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
• K49020: Dismounted Hub	-	48.449	32.643	-	32.643	-	-	-	-	-	-

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 1206120A / <i>Assured Positioning, Navigation and Timing (PNT)</i>	<b>Project (Number/Name)</b> FJ9 / <i>Dismounted A-PNT</i>

**C. Other Program Funding Summary (\$ in Millions)**

<u>Line Item</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022</u> <u>Base</u>	<u>FY 2022</u> <u>OCO</u>	<u>FY 2022</u> <u>Total</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>FY 2026</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
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**Remarks**

K49020 / Dismounted Hub is an OPA subset of Line Item Number 9897K49000 / Assured Positioning, Navigation and Timing.

**D. Acquisition Strategy**

Dismounted A-PNT program will provide the Soldier conducting operations outside of vehicles the means to maintain accurate position, velocity, and time information in Global Positioning System (GPS) challenged or degraded/denied environments where space based PNT may be limited or denied. The Dismounted A-PNT capability will provide improved performance over the currently fielded Defense Advanced GPS Receiver.

The first iteration of capabilities will employ tailored processes to identify and close key technology gaps. Technologies available from Industry today will be evaluated for performance and operational suitability and equipped to select critical units. This will be implemented by utilizing Other Transaction Authority (OTA)'s to competitively obtain prototypes. The Government will conduct laboratory and performance testing. The findings from these efforts will provide technology viability and allow for the transition to limited production. Providing initial equipment to specified units will result in an assessment to determine production and fielding readiness of the capability.

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army** **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 1206120A / Assured Positioning, Navigation and Timing (PNT)	<b>Project (Number/Name)</b> FJ9 / Dismounted A-PNT
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<b>Management Services (\$ in Millions)</b>				<b>FY 2020</b>		<b>FY 2021</b>		<b>FY 2022 Base</b>		<b>FY 2022 OCO</b>		<b>FY 2022 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>			
Project Management Support - Contractor	C/CPFF	Various : Various	1.435	0.515	Dec 2019	-		-		-		-	0.000	1.950	-
<b>Subtotal</b>			1.435	0.515		-		-		-		-	0.000	1.950	N/A

**Remarks**  
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<b>Product Development (\$ in Millions)</b>				<b>FY 2020</b>		<b>FY 2021</b>		<b>FY 2022 Base</b>		<b>FY 2022 OCO</b>		<b>FY 2022 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>			
Dismounted A-PNT Prototyping & Development Vendor 1	C/FFP	Integrated Solutions for Systems, Inc. (IS4S) : Auburn, AL	6.112	5.367	Jan 2020	-		-		-		-	0.000	11.479	-
Dismounted A-PNT Prototyping & Development Vendor 2	C/FFP	Mayflower Communications Company, Inc : Bedford, MA	2.206	1.565	Jan 2020	-		-		-		-	0.000	3.771	-
Dismounted A-PNT Prototyping & Delivery	C/FFP	NAL Research Corporation : Manassas, VA	-	13.034	Apr 2020	-		-		-		-	0.000	13.034	-
Development of a Dismounted M-Code capable prototype	MIPR	L3 Technologies Interstate Electronics Corporation : Anaheim, CA	1.300	0.330	Feb 2020	-		-		-		-	0.000	1.630	-
Development of a small SWAP-C multi sensor navigation prototype	MIPR	CERDEC Command Power and Integration Directorate : APG, MD	0.896	-		-		-		-		-	0.000	0.896	-
Engineering and Technical Product Development	MIPR	C5ISR : Various	1.060	2.207	Dec 2019	-		-		-		-	0.000	3.267	-
Nett Warrior Integration	MIPR	Various : Various	0.783	0.578	Feb 2020	-		-		-		-	0.000	1.361	-

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army** **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 1206120A / Assured Positioning, Navigation and Timing (PNT)	<b>Project (Number/Name)</b> FJ9 / Dismounted A-PNT
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<b>Product Development (\$ in Millions)</b>				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
<b>Subtotal</b>			12.357	23.081	-	-	-	-	-	-	-	-	0.000	35.438	N/A

<b>Support (\$ in Millions)</b>				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Engineering and Technical Services - Government	Various	C5ISR : Various	0.372	0.674	Nov 2019	-	-	-	-	-	-	-	0.000	1.046	-
Engineering and Technical Services - Contractor	C/CPFF	DCS Corporation : APG, MD	1.120	1.872	Jan 2020	-	-	-	-	-	-	-	0.000	2.992	-
<b>Subtotal</b>			1.492	2.546	-	-	-	-	-	-	-	-	0.000	4.038	N/A

<b>Test and Evaluation (\$ in Millions)</b>				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Test Support	C/Various	Various : Various	0.100	3.350	Dec 2019	-	-	-	-	-	-	-	0.000	3.450	-
<b>Subtotal</b>			0.100	3.350	-	-	-	-	-	-	-	-	0.000	3.450	N/A

	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
<b>Project Cost Totals</b>		15.384	29.492	0.000	-	-	0.000	44.876	N/A

**Remarks**

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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2022 Army</b>		<b>Date: May 2021</b>
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 1206120A / <i>Assured Positioning, Navigation and Timing (PNT)</i>	<b>Project (Number/Name)</b> FJ9 / <i>Dismounted A-PNT</i>

Event Name	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Dismounted A-PNT M-Code / SWAP-C Prototypes	[Redacted]				[Redacted]																							
	M-Code / SWAP-C Prototypes																											
Dismounted A-PNT Prototyping & Delivery	[Redacted]				[Redacted]																							
	Prototyping & Delivery																											
Dismounted A-PNT Prototype Testing	[Redacted]				[Redacted]																							
	Prototype Testing																											
Dismounted A-PNT Nett Warrior Integration	[Redacted]				[Redacted]																							
	Nett Warrior Integration																											

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 1206120A / <i>Assured Positioning, Navigation and Timing (PNT)</i>	<b>Project (Number/Name)</b> FJ9 / <i>Dismounted A-PNT</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Dismounted A-PNT M-Code / SWAP-C Prototypes	1	2019	2	2021
Dismounted A-PNT Prototype Acquisition Decision	2	2019	2	2019
Dismounted A-PNT Prototyping & Delivery	2	2019	2	2021
Dismounted A-PNT Prototype Testing	1	2020	2	2021
Dismounted A-PNT Nett Warrior Integration	4	2019	1	2021

**Note**

Program Element (PE) 1206120A project FJ9 transitions to PE 0604120A project EH8 beginning in FY 2021.



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**Exhibit R-2A, RDT&E Project Justification:** PB 2022 Army **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 1206120A / <i>Assured Positioning, Navigation and Timing (PNT)</i>	<b>Project (Number/Name)</b> FK2 / <i>Mounted A-PNT</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
FK2: <i>Mounted A-PNT</i>	-	54.725	-	-	-	-	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

**Note**

Program Element (PE) 1206120A project FK2 transitions to PE 0604120A project EJ2 beginning in FY 2021.

**A. Mission Description and Budget Item Justification**

Mission Command Network Modernization Implementation Plan - Line of Effort 1, 17 April 2018.

Mounted Assured Positioning, Navigation and Timing System (MAPS) will provide the Army's ground maneuver forces access to assured PNT information under conditions where space-based PNT Global Positioning System (GPS) may be limited or denied. A-PNT products are ruggedized tactical systems which provides electronic protection capabilities that enable combatant commanders the ability to move, shoot, and communicate in a Global Positioning System (GPS) challenged or denied environments. MAPS addresses two critical capability gaps: Access and Integrity. Access is the ability to retrieve accurate PNT information in a contested Electronic Warfare/Cyber environment. Integrity is the ability to trust the PNT data. PNT is a critical enabler of many Army Maneuver, Fire and Command and Control systems that are dependent on accurate Position and Timing.

Mounted Hub A-PNT: The Mounted Assured Positioning, Navigation, and Timing (PNT) System (MAPS) is a platform-mounted, ruggedized tactical PNT system which provides electronic protection capabilities that enable combatant commanders the ability to move, shoot, and communicate in a Global Positioning System (GPS) challenged or denied environments. Included in the MAPS is the Anti-Jam Antenna System (AJAS) which provides GPS signal point protection and PNT Assurance in challenged environments through Anti-Jam technologies. The MAPS will provide PNT when GPS is degraded or denied through M-code, ALTNAV, timing, sensor fusion, anti-jam antenna, and beam steering. This capability will deliver distributed assured PNT capabilities to mounted platforms over time in an iterative, affordable manner that allows for future modernization. This capability will assist in delivering distributed assured PNT capabilities to mounted platforms over time in an iterative, affordable manner that allows for future modernization.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	FY 2020	FY 2021	FY 2022
<b>Title:</b> Mounted A-PNT System (MAPS)	54.725	-	-
<b>Description:</b> This effort supports the delivery of MAPS prototypes for platform integration, performance and reliability testing, technical evaluation, and operational assessment.			
<b>Accomplishments/Planned Programs Subtotals</b>	54.725	-	-

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army	<b>Date:</b> May 2021
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<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 1206120A / <i>Assured Positioning, Navigation and Timing (PNT)</i>	<b>Project (Number/Name)</b> FK2 / <i>Mounted A-PNT</i>
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**C. Other Program Funding Summary (\$ in Millions)**

<u>Line Item</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022</u> <u>Base</u>	<u>FY 2022</u> <u>OCO</u>	<u>FY 2022</u> <u>Total</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>FY 2026</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• K49030: <i>Mounted Hub A-PNT</i>	41.728	86.610	80.658	-	80.658	-	-	-	-	-	-

**Remarks**  
K49030 / Mounted Hub A-PNT is an OPA subset of Line Item Number 9897K49000 / Assured Positioning, Navigation and Timing

**D. Acquisition Strategy**

The goal of the Mounted Assured Positioning, Navigation and Timing (PNT) System (MAPS) program is to deliver distributed assured PNT capabilities to mounted platforms over time in an iterative, affordable manner that allows for future modernization. The first iteration of capabilities will employ tailored processes to identify and close key technology gaps. Technologies available from Industry today will be evaluated for performance and operational suitability and equipped to select critical units. This will be implemented by utilizing a competitive Other Transaction Agreement (OTA) to obtain prototypes. The Government will conduct Electromagnetic Interference and Environmental Testing, as well as performance testing in the System Integration Lab (SIL), anechoic chamber testing and a Military Feasibility Assessment (MFA). The findings from these tests and assessment efforts will determine whether or not to begin platform integration. Providing initial equipment to specified units will result in an assessment to determine production and fielding readiness of the capability.

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army** **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 1206120A / Assured Positioning, Navigation and Timing (PNT)	<b>Project (Number/Name)</b> FK2 / Mounted A-PNT
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<b>Management Services (\$ in Millions)</b>				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Project Management Support	C/CPPF	Various : Various	1.381	3.952	Jan 2020	-		-		-		-	0.000	5.333	-
<b>Subtotal</b>			1.381	3.952		-		-		-		-	0.000	5.333	N/A

<b>Product Development (\$ in Millions)</b>				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Mounted/AJAS Prototype Development Contract	C/FFP	Various : Various	4.455	18.328	Jan 2020	-		-		-		-	0.000	22.783	-
Manufacturing Readiness (Product Maturation) Contract	C/FFP	Collins Aerospace : Cedar Rapids, IA	-	9.200	Sep 2020	-		-		-		-	0.000	9.200	-
Mounted PNT Integration - Combat Platforms	Various	Various : Warren, MI	-	2.270	Feb 2020	-		-		-		-	0.000	2.270	-
Mounted PNT Integration - Combat Support Platforms	MIPR	PEO CS&CSS : Various	0.975	0.477	Sep 2020	-		-		-		-	0.000	1.452	-
Mounted PNT Integration - Combat Systems Platforms	Various	Various : Various	-	3.630	Oct 2019	-		-		-		-	0.000	3.630	-
Client Software Integration (JBCP / MMC)	MIPR	AMRDEC/S3I : APG, MD	0.544	-		-		-		-		-	0.000	0.544	-
Engineering and Technical Product Development	MIPR	C5ISR : APG, MD	4.361	4.753	Mar 2020	-		-		-		-	0.000	9.114	-
<b>Subtotal</b>			10.335	38.658		-		-		-		-	0.000	48.993	N/A

**Remarks**  
Client and Platform Integration is required for 81 Platforms and 27 Client PMs.

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army** **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 1206120A / Assured Positioning, Navigation and Timing (PNT)	<b>Project (Number/Name)</b> FK2 / Mounted A-PNT
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<b>Support (\$ in Millions)</b>				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Engineering and Technical Services - Government	MIPR	C5ISR : Various	0.639	0.741	Dec 2019	-		-		-		-	0.000	1.380	-
Engineering and Technical Services - Contractor	C/CPFF	DCS : Various	3.498	5.413	Jan 2020	-		-		-		-	0.000	8.911	-
<b>Subtotal</b>			4.137	6.154		-		-		-		-	0.000	10.291	N/A

<b>Test and Evaluation (\$ in Millions)</b>				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Performance Testing	MIPR	C5ISR : Various	1.294	3.296	Jan 2020	-		-		-		-	0.000	4.590	-
Reliability Testing	MIPR	C5ISR : Various	-	0.430	Mar 2020	-		-		-		-	0.000	0.430	-
Field Testing	MIPR	Army Test and Evaluation Command (ATEC) : White Sands Missile Range (WSMR)	0.415	1.691	Jan 2020	-		-		-		-	0.000	2.106	-
Military Feasibility Assessment (MFA)	MIPR	Various : TBD	2.111	-		-		-		-		-	0.000	2.111	-
Systems Engineering and Integration Testing & Support	MIPR	CERDEC Command Power and Integration Directorate : APG, MD	2.903	0.544	Sep 2020	-		-		-		-	0.000	3.447	-
<b>Subtotal</b>			6.723	5.961		-		-		-		-	0.000	12.684	N/A

	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
<b>Project Cost Totals</b>		22.576	54.725	0.000	-	-	0.000	77.301	N/A

**Remarks**  
Program Element (PE) 1206120A project FK2 transitions to PE 0604120A project EJ2 beginning in FY 2021. Program schedule continues on PE 0604120A project EJ2.

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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2022 Army</b>		<b>Date: May 2021</b>
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 1206120A / <i>Assured Positioning, Navigation and Timing (PNT)</i>	<b>Project (Number/Name)</b> FK2 / <i>Mounted A-PNT</i>

Event Name	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Mounted A-PNT Risk Reduction Activities	Risk Reduction Activities																											
Mounted A-PNT Prototyping and Testing - Phase II	Prototyping and Testing - Phase II																											
MAPS Technology Insertion - Alt Nav	MAPS Technology Insertion - Alt Nav																											
Client and Platform Integration	Client and Platform Integration																											
Operational Technical Demonstration	OTD																											
Direct Requirement Decision Preferred Material Solution	Direct Requirement Decision Preferred Material Solution																											

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<b>Exhibit R-4A, RDT&amp;E Schedule Details: PB 2022 Army</b>		<b>Date: May 2021</b>
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 1206120A / <i>Assured Positioning, Navigation and Timing (PNT)</i>	<b>Project (Number/Name)</b> FK2 / <i>Mounted A-PNT</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Mounted A-PNT Risk Reduction Activities	1	2019	4	2021
Mounted A-PNT Prototyping and Testing - Phase I	1	2019	4	2019
Mounted A-PNT Prototyping and Testing - Phase II	4	2019	4	2020
MAPS Technology Insertion - Alt Nav	2	2020	3	2021
Client and Platform Integration	3	2019	4	2021
Operational Technical Demonstration	4	2020	4	2020
Direct Requirement Decision Preferred Material Solution	4	2020	4	2020

**Note**

Program schedule continues on PE 0604120A project EJ2.

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**Exhibit R-2A, RDT&E Project Justification:** PB 2022 Army **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 1206120A / Assured Positioning, Navigation and Timing (PNT)	<b>Project (Number/Name)</b> FK3 / Anti-Jam Antenna
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
FK3: Anti-Jam Antenna	-	8.455	-	-	-	-	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

**Note**

Program Element (PE) 1206120A project FK3 transitions to PE 0604120A project EJ2 beginning in FY 2021.

**A. Mission Description and Budget Item Justification**

Mounted Assured Positioning, Navigation and Timing System (MAPS) implements congressional and OSD guidance to develop and field M-code Ground User Equipment (MGUE) receivers and provides the Army's ground maneuver forces access to assured PNT information under conditions where space-based PNT Global Positioning System (GPS) may be limited or denied. A-PNT products are ruggedized tactical systems which provide electronic protection capabilities that enable Army forces the ability to move, shoot, communicate, and provide situational awareness in Global Positioning System (GPS) challenged or denied environments. MAPS addresses two critical capability gaps: Access and Integrity. Access is the ability to retrieve PNT information in a contested Electronic Warfare/Cyber environment. Integrity is the ability to trust the PNT information. PNT is a critical enabler of many Army Maneuver, Fire and Command and Control systems that are dependent on accurate Position and Timing. The MAPS will provide PNT when GPS is degraded or denied through M-code, ALTNAV, timing, sensor fusion, anti-jam antenna, and beam steering. This capability will deliver distributed assured PNT capabilities to mounted platforms over time in an iterative, affordable manner that allows for future modernization.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	FY 2020	FY 2021	FY 2022
<b>Title:</b> Anti-Jam Antenna System	8.455	-	-
<b>Description:</b> This effort supports the delivery of MAPS prototypes for platform integration, performance and reliability testing, technical evaluation, and operational assessment.			
<b>Accomplishments/Planned Programs Subtotals</b>	8.455	-	-

**C. Other Program Funding Summary (\$ in Millions)**

N/A

**Remarks**

**D. Acquisition Strategy**

The goal of the Anti-Jam Antenna System (AJAS) program is to deliver distributed A-PNT capabilities to mounted platforms over time in an iterative, affordable manner that allows for future modernization. The first iteration of capabilities will employ tailored processes to identify and close key technology gaps. Technologies available from Industry today will be evaluated for performance and operational suitability and equipped to select critical units. This will be implemented by utilizing a competitive Other Transaction Agreement (OTA) to obtain prototypes. The Government will conduct partial Electromagnetic Interference and Environmental Testing, as well as

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**Exhibit R-2A, RDT&E Project Justification:** PB 2022 Army **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 1206120A / <i>Assured Positioning, Navigation and Timing (PNT)</i>	<b>Project (Number/Name)</b> FK3 / <i>Anti-Jam Antenna</i>
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performance testing in the System Integration Lab (SIL), anechoic chamber testing and a Military Feasibility Assessment. The findings from these test and assessment efforts will determine whether or not to proceed to platform integration. Providing initial equipment to specified units will result in an assessment to determine production and fielding readiness of the capability.



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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army												Date: May 2021			
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)							
2040 / 4				PE 1206120A / Assured Positioning, Navigation and Timing (PNT)				FK3 / Anti-Jam Antenna							
Management Services (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Project Management Support	C/CPFF	Various : Various	0.338	0.402	Nov 2019	-		-		-		-	0.000	0.740	-
<b>Subtotal</b>			0.338	0.402		-		-		-		-	0.000	0.740	N/A
Product Development (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Mounted and AJAS Prototype Development Contract	C/FFP	Various : Various	2.231	2.160	Feb 2020	-		-		-		-	0.000	4.391	-
Manufacturing Readiness (Product Maturation) Contract	C/FFP	Collins Aerospace : Cedar Rapids, IA	-	0.997	Sep 2020	-		-		-		-	0.000	0.997	-
Mounted PNT Integration - Combat Platforms	MIPR	PM Styer : Warren, MI	-	0.894	Jul 2020	-		-		-		-	0.000	0.894	-
Mounted PNT Integration - Combat Support Platforms	MIPR	JPO JLTV : Warren, MI	-	0.209	May 2020	-		-		-		-	0.000	0.209	-
Client Software Integration (JBCP / MMC)	MIPR	AMERDEC/S3I Directorate : APG,MD	-	0.801	Nov 2019	-		-		-		-	0.000	0.801	-
Development of the Systems Engineering and Integration Lab	MIPR	CERDEC Command Power and Integration Lab : APG, MD	-	0.041	Jan 2021	-		-		-		-	0.000	0.041	-
Engineering and Technical Product Development	MIPR	C5ISR : APG,MD	1.820	-		-		-		-		-	0.000	1.820	-
<b>Subtotal</b>			4.051	5.102		-		-		-		-	0.000	9.153	N/A

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army** **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 1206120A / Assured Positioning, Navigation and Timing (PNT)	<b>Project (Number/Name)</b> FK3 / Anti-Jam Antenna
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<b>Support (\$ in Millions)</b>				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Engineering and Technical Services - Government	MIPR	C5ISR : Various	0.034	0.351	Oct 2019	-		-		-		-	0.000	0.385	-
Engineering and Technical Services - Contractor	C/CPFF	C5ISR : Various	2.076	0.142	Jun 2020	-		-		-		-	0.000	2.218	-
<b>Subtotal</b>			2.110	0.493		-		-		-		-	0.000	2.603	N/A

<b>Test and Evaluation (\$ in Millions)</b>				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Live Sky Demo and Antenna Anechoic Chamber Test	MIPR	CERDEC - Command Power and Integration Directorate : APG, MD	0.384	-		-		-		-		-	0.000	0.384	-
Anti-Jam Antenna Integrity/ Performance Testing	MIPR	CERDEC STCD : APG,MD	1.098	2.458	Jan 2020	-		-		-		-	0.000	3.556	-
TNT Prototype testing	MIPR	CERDEC STCD : APG, MD	0.128	-		-		-		-		-	0.000	0.128	-
<b>Subtotal</b>			1.610	2.458		-		-		-		-	0.000	4.068	N/A

	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
<b>Project Cost Totals</b>	8.109	8.455	0.000	-	-	-	0.000	16.564	N/A

**Remarks**  
Program Element (PE) 1206120A project FK3 transitions to PE 0604120A project EJ2 beginning in FY 2021. Program schedule continues on PE 0604120A project EJ2.

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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2022 Army</b>		<b>Date: May 2021</b>
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 1206120A / Assured Positioning, Navigation and Timing (PNT)	<b>Project (Number/Name)</b> FK3 / Anti-Jam Antenna

Event Name	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Anti-Jam Antenna Risk Reduction Activities	Risk Reduction Activities																											
Directed Requirement Decision Preferred Material Solution				1																								
Anti-Jam Antenna Prototyping and Testing - Phase II	Prototyping and Testing Phase II																											
MAPS/AJAS Technology Insertion - Alt Nav	MAPS/AJAS Technology Insertion - Alt Nav																											

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 1206120A / <i>Assured Positioning, Navigation and Timing (PNT)</i>	<b>Project (Number/Name)</b> FK3 / <i>Anti-Jam Antenna</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Anti-Jam Antenna Risk Reduction Activities	1	2019	4	2021
Anti-Jam Antenna Prototyping and Testing - Phase I	1	2019	4	2019
Phase I OTA Prototype Testing	3	2019	4	2019
Antenna Anechoic Chamber Test Integrity/Performance Testing	3	2019	4	2019
Directed Requirement Decision Preferred Material Solution	4	2020	4	2020
Live Sky Demo	1	2019	2	2019
Anti-Jam Antenna Prototyping and Testing - Phase II	4	2019	4	2020
MAPS/AJAS Technology Insertion - Alt Nav	2	2020	3	2021

**Note**

Program schedule continues on PE 0604120A project EJ2.

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2022 Army **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040: <i>Research, Development, Test &amp; Evaluation, Army / BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>					<b>R-1 Program Element (Number/Name)</b> PE 1206308A / <i>Army Space Systems Integration</i>							
COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	-	100.985	-	-	-	-	-	-	-	-	-	-
FE5: <i>Space And Missile Defense Integration</i>	-	100.985	-	-	-	-	-	-	-	-	-	-

**A. Mission Description and Budget Item Justification**

This Program Element (PE) funds space systems integration efforts performed by the US Army Space and Missile Defense Command/Army Forces Strategic Command (USASMDC/ARSTRAT) and the Program Executive Office for Intelligence, Electronic Warfare (PEO IEW&S) to develop and field space superiority capabilities.

Project FE5: Funds USASMDC/ARSTRAT to integrate warfighting concepts and technologies, validate concepts, and identify capabilities needed to implement the validated concepts, and develop DOTMLPF solutions to realize those space and high altitude related capabilities. Provide engineering support to the Joint Friendly Force Tracking (J-FFT) Mission Management Center (MMC) through an associated test-bed for both operational and developmental injection and integration of real-time J-FFT information into the Common Operating Picture (COP) for Combatant Commanders (CCMDs), Joint Task Forces (JTFs), and Coalition Partners. The MMC injects real-time J-FFT information into the COP for CCMDs, JTFs and Coalition partners. USSTRATCOM, in accordance with CJCSI 3910.01 (reference V.4.) is designated one of three coordinating agencies for J-FFT within DoD. CJCSI 3910.01 directs eight Force Modernization tasks to USSTRATCOM. USSTRATCOM SI 534-5 (reference V.6.) and annually published USSTRATCOM operations orders have designated USASMDC/ARSTRAT as the lead USSTRATCOM component command for Friendly Force Tracking (FFT).

Project FE6: Details of this program are reported in accordance with Title 10, United States Code, Section 119 (a)(1).

<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022 Base</b>	<b>FY 2022 OCO</b>	<b>FY 2022 Total</b>
Previous President's Budget	104.996	0.000	0.000	-	0.000
Current President's Budget	100.985	0.000	0.000	-	0.000
Total Adjustments	-4.011	0.000	0.000	-	0.000
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-4.011	-			

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**Exhibit R-2A, RDT&E Project Justification:** PB 2022 Army **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4					<b>R-1 Program Element (Number/Name)</b> PE 1206308A / Army Space Systems Integration				<b>Project (Number/Name)</b> FE5 / Space And Missile Defense Integration			
COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
FE5: Space And Missile Defense Integration	-	100.985	-	-	-	-	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**Note**

This project transitions to 0603308A / 990.

**A. Mission Description and Budget Item Justification**

The Friendly Force Data Integration and Management (FFDIM) Capability Definition Package (CDP), a Joint Capabilities Integration and Development System (JCIDS) requirements document (October 2017) validated the Joint Friendly Force Tracking (JFFT) Testbed's development, testing and integration capabilities and Friendly Force Tracking (FFT) System Expert support provided by U.S. Army Space and Missile Defense Command/Army Forces Strategic Command (USASMDC/ARSTRAT) as U.S. Strategic Command's (USSTRATCOM's) Army Service Component Command (ASCC). In addition, Chairman of the Joint Chiefs of Staff Instruction 3910 (FFT Operations Guidance) directs USSTRATCOM's ASCC to execute eight specified FFT mission support responsibilities that include providing a testing and development capability to support joint, interagency and coalition partners FFT operations. USASMDC/ARSTRAT: Headquarters, Department of the Army General Order 37, dated 16 October 2006, designated USASMDC/ARSTRAT as the Army proponent for space, the Army integrator for global missile defense (GMD), and the Army Service Component Command (ASCC) of the USSTRATCOM. Army Regulation (AR) 10-87, Army Commands, Army Service Component Commands, and Direct Reporting Units, dated 4 September 2007, and AR 5-22, The Army Force Modernization Proponent System, dated 19 August 2009, designated USASMDC/ARSTRAT as the Army specified proponent for Space/High Altitude capabilities. As the Army proponent for space and high altitude, USASMDC/ARSTRAT is responsible for developing warfighting concepts, conduct warfighting experiments to validate those concepts, identify capabilities needed to implement the validated concepts, and develop Doctrine, Organizations, Training, Material, Leadership & Education, Personnel, Facilities and Policy (DOTMLPF-P) solutions.

Project FE5 funds USASMDC/ARSTRAT efforts to develop, analyze and mature warfighting concepts, and conduct warfighting experiments for space and high altitude capabilities. USASMDC/ARSTRAT is the proponent for space/high altitude capabilities and is responsible for determining and integrating DOTMLPF-P for the Army. The program also funds development and integration of new data sources and services into the JFFT Mission Management Center (MMC), providing users FFT information system services at the highest Mission Assurance Category level (MAC 1). Software products developed and deployed by the JFFT Testbed into the MMC enable the receipt, integration and dissemination of real-time FFT information to the Common Operating Picture (COP) displays for Combatant Commanders, Joint Task Forces and coalition partners. JFFT Subject Matter Expert support to critical FFT interoperability assessments and development activities with coalition partners are supporting DOD's priority of strong alliances and partnerships. Integrated FFT data solutions developed by JFFT Testbed enable FFT data for COP display and Situational Awareness between Army forces and Unified Action Partners. The JFFT Testbed will continue to leverage FFT systems expertise and reduce Department of Defense costs by supporting numerous efforts, including the joint Personnel Recovery community response to a Joint Urgent Operational Needs Statement to resolve critical issues in isolated persons reporting and locating.

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army		<b>Date:</b> May 2021		
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 1206308A / Army Space Systems Integration	<b>Project (Number/Name)</b> FE5 / Space And Missile Defense Integration		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
<b>Title:</b> Architecture Development, Wargames and Demonstrations <b>Description:</b> Funding is provided for planning, developing, and executing architectures and combat development solutions for Army integration of space systems, space control capabilities, missile defense, and high altitude systems.		7.909	-	-
<b>Title:</b> Joint Friendly Force Tracking (J-FFT) Testbed <b>Description:</b> Funding is provided to enable the Joint Friendly Force Tracking (J-FFT) Testbed to develop and integrate Combat Commanders' FFT and Hostile Force Tagging, Tracking, and Locating (HF TTL) requirements into existing and future command and control network architectures, leveraging network enabled command and control system enhancements, and continuing to support development of FFT capabilities for deployed and coalition forces.		2.596	-	-
<b>Title:</b> Organizational Development as Part of the SRC40 Proponency Mission <b>Description:</b> Continue participation in the Force Design Update (FDU) process. Development of Operational & Organizational (O&O) Concept Papers, Organization Design Papers, Cost Benefit Analyses, Unit Reference Sheets (URS), and Manpower Requirements Criteria (MARC) determination.		1.050	-	-
<b>Title:</b> Position, Navigation, and Timing Navigation Warfare (PNT/NAVWAR) <b>Description:</b> Identifying and advocating for positioning, navigation, and timing (PNT) and Navigation Warfare (NAVWAR) requirements through CDR USSTRATCOM to the Joint Staff to establish and formalize joint NAVWAR requirements, in the Joint Capabilities Integration and Development System (JCIDS) process. Continuing to identify and advocate for PNT and NAVWAR emerging requirements through Commander, U.S. Strategic Command to the Joint Staff to establish and formalize joint NAVWAR requirements, in the JCIDS process and supporting the Army Assured Positioning Navigation and Timing (APNT) Cross Functional Team by conducting required capability analysis and developing JCIDS documents for its three Lines of Effort: Assured PNT, Navigation Warfare, and Space. USASMDC/ARSTRAT Future Warfare Center will execute these funds in FY 2020.		1.810	-	-
<b>Title:</b> Narrowband C-SSE enterprise level capability to monitor, detect, and assess UHF SATCOM interference <b>Description:</b> Developing and deploying Narrowband Consolidated SATCOM System Expert (C-SSE) SATCOM Tools that will allow the U.S. Army to fight SATCOM. The USASMDC/ARSTRAT NB C-SSE Division executes the SATCOM electromagnetic interference (EMI) mission in support of CCMDs, Services, Agencies, and Warfighters. Two critical elements of that support are to provide NB EMI management and Space Situation Awareness. Once fully developed and operational, coupled with a sustainment plan, this will improve the joint commander's ability to "fight SATCOM" in a contested environment.		11.157	-	-
<b>Title:</b> Low Earth Orbit Strategy		76.463	-	-

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 1206308A / Army Space Systems Integration	<b>Project (Number/Name)</b> FE5 / Space And Missile Defense Integration

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
<b>Description:</b> A dedicated constellation of small satellites to provide resilient, persistent LEO capability to address shortfalls in current reconnaissance, surveillance, and target acquisition (RSTA) and PNT systems. Provides the ability to identify and locate targets of interest in denied and contested environments actionable to the tactical warfighter. This includes the Battle Management, Command and Communication (BMC2) capability required to task payloads and fuse data, as well as algorithms to enhance, analyze, and disseminate this data to the tactical warfighter via existing Army systems and networks in support of Sensor-to-Shooter demonstrations directly supporting Long Range Precision Fires (LRPF).			
<b>Accomplishments/Planned Programs Subtotals</b>	100.985	-	-

**C. Other Program Funding Summary (\$ in Millions)**

N/A

**Remarks**

N/A

**D. Acquisition Strategy**

N/A



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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army** **Date:** May 2021

<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 1206308A / Army Space Systems Integration	<b>Project (Number/Name)</b> FE5 / Space And Missile Defense Integration
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<b>Management Services (\$ in Millions)</b>				<b>FY 2020</b>		<b>FY 2021</b>		<b>FY 2022 Base</b>		<b>FY 2022 OCO</b>		<b>FY 2022 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>			
Government Personnel and operations support.	TBD	SMDC/ARSTRAT Huntsville, AL and Colorado Springs : SMDC/ARSTRAT Huntsville, AL and Colorado Springs	16.826	6.666		-		-		-		-	0.000	23.492	-
FY 2020 SBIR/STTR Transfer	TBD	Various : Various	-	-		-		0.000		-		0.000	-	-	-
<b>Subtotal</b>			16.826	6.666		-		0.000		-		0.000	0.000	23.492	N/A

**Remarks**  
N/A

<b>Product Development (\$ in Millions)</b>				<b>FY 2020</b>		<b>FY 2021</b>		<b>FY 2022 Base</b>		<b>FY 2022 OCO</b>		<b>FY 2022 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>			
Contracts for Experiments & technology enhancements of prototypes/tools and analysis	Various	SMDC/ARSTRAT Huntsville, AL and Colorado Springs : SMDC/ARSTRAT Huntsville, AL and Colorado Springs	15.655	17.018		-		-		-		-	0.000	32.673	-
Low Earth Orbit	C/Various	Various : Huntsville AL, Wilmngton, MA, Boulder CO, VA	7.500	77.301		-		-		-		-	0.000	84.801	-
<b>Subtotal</b>			23.155	94.319		-		-		-		-	0.000	117.474	N/A

	<b>Prior Years</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022 Base</b>	<b>FY 2022 OCO</b>	<b>FY 2022 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Project Cost Totals</b>		39.981	100.985	0.000	0.000	-	0.000	140.966	N/A

**Remarks**

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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2022 Army</b>			<b>Date: May 2021</b>
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 1206308A / Army Space Systems Integration	<b>Project (Number/Name)</b> FE5 / Space And Missile Defense Integration	

Event Name	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Development of SMDC MMC Force Tracking	█				█																							
Jericho Thunder Analysis Support	█																											
SMDC NanoSat Analysis (SNAP, KE)	█																											
Space Superiority Joint Architecture Analysis	█																											
Force Design Assessment of Army Forces	█																											
NAVWAR/PNT Gap Analysis and Advocacy	█																											
Implications of the Emerging "Third" Offset Strategy for SMDC S	█																											
Space Simulation Support to TRADOC ARCIC Experimentation	█																											
Common Ground Station Operating Concept and Requirement D	█																											
NAVWAR Defense/Attack Operating Concepts and Requirement	█																											
Army Enduring JFFT Development	█																											
High Altitude Persistent Platform Capability Development Docu	█																											
NAVWAR/PNT in Denied Environment	█																											

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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2022 Army</b>		<b>Date: May 2021</b>
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 1206308A / Army Space Systems Integration	<b>Project (Number/Name)</b> FE5 / Space And Missile Defense Integration

Event Name	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Space Superiority Capability Development	█				█																							
Counter ISR Capability Development	█																											
Space Operations Multi-Domain Environment Analysis	█																											
NAVWAR Attack Study	█																											
Pseudolite Performance Analysis	█																											
APNT CFT Analysis Support	█																											
Joint Space Warfighting Forum (JSWF) Analysis Support	█																											
Support of the APN/CFT	█																											
Own Earth Orbit	█																											

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 1206308A / Army Space Systems Integration	<b>Project (Number/Name)</b> FE5 / Space And Missile Defense Integration

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Development of SMDC MMC Force Tracking	1	2018	4	2020
Jericho Thunder Analysis Support	1	2019	4	2020
SMDC NanoSat Analysis (SNAP, KE)	1	2019	4	2020
Space Superiority Joint Architecture Analysis	1	2018	4	2020
Force Design Assessment of Army Forces	1	2019	4	2020
NAVWAR/PNT Gap Analysis and Advocacy	1	2018	2	2020
Implications of the Emerging "Third" Offset Strategy for SMDC Space	1	2019	4	2020
Space Simulation Support to TRADOC ARCIC Experimentation	1	2018	4	2020
Common Ground Station Operating Concept and Requirement Document	1	2019	3	2020
NAVWAR Defense/Attack Operating Concepts and Requirements Documentation	1	2018	4	2020
Army Enduring JFFT Development	1	2018	4	2020
High Altitude Persistent Platform Capability Development Document	1	2018	4	2020
NAVWAR/PNT in Denied Environment	1	2019	2	2020
Space Superiority Capability Development	1	2018	4	2020
Counter ISR Capability Development	3	2017	4	2020
Space Operations Multi-Domain Environment Analysis	4	2017	4	2020
ICEWS Study	4	2018	4	2019
High Altitude Impacts on Ground Effectiveness Study	4	2018	4	2019
NAVWAR Characterization Study	4	2018	4	2019
NAVWAR Attack Study	4	2019	4	2020
Psuedolite Performance Analysis	2	2019	1	2020
APNT CFT Analysis Support	3	2018	4	2020

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2022 Army		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 1206308A / Army Space Systems Integration	<b>Project (Number/Name)</b> FE5 / Space And Missile Defense Integration

Events	Start		End	
	Quarter	Year	Quarter	Year
Joint Space Warfighting Forum (JSWF) Analysis Support	1	2018	4	2020
Support of the APN/CFT	1	2018	4	2020
Ow Earth Orbit	1	2020	4	2020